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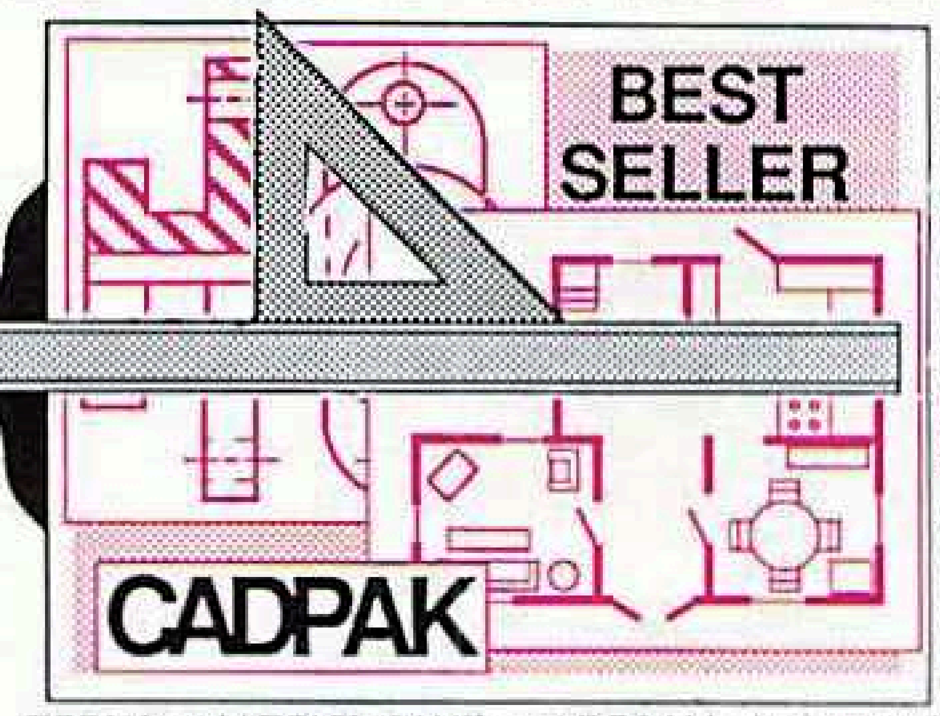


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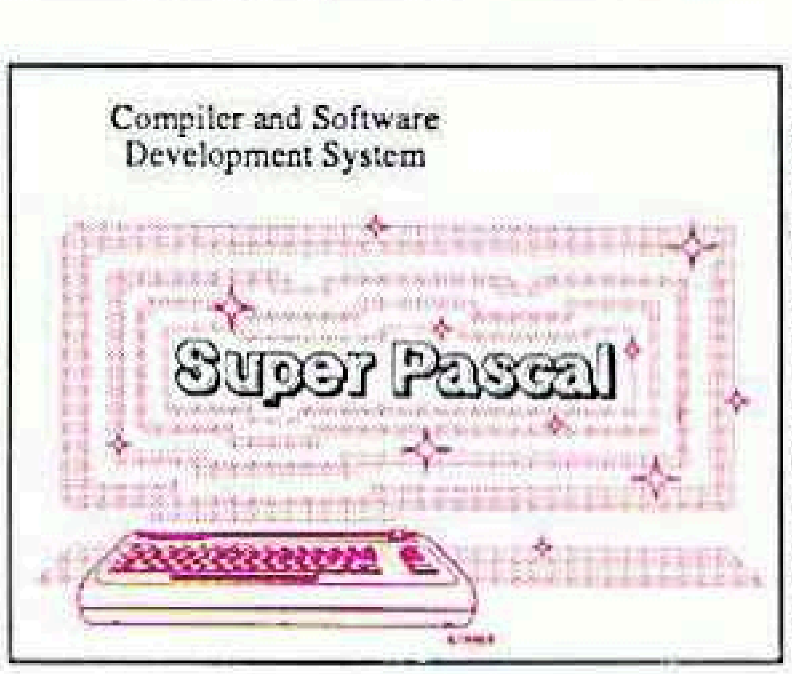
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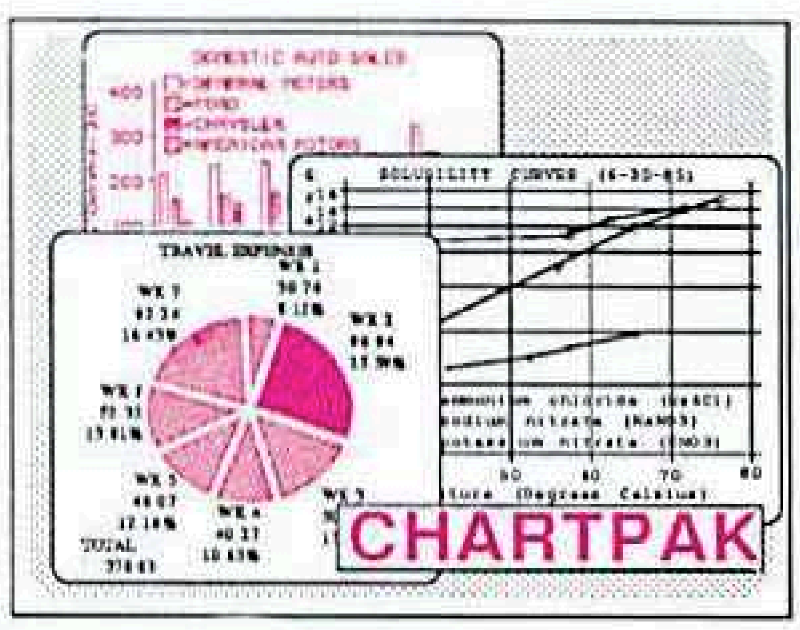
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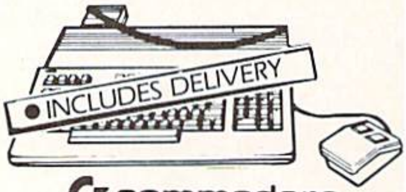
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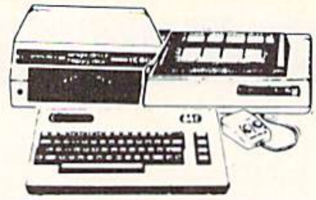


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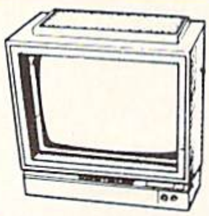
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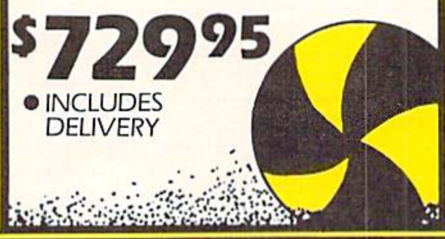


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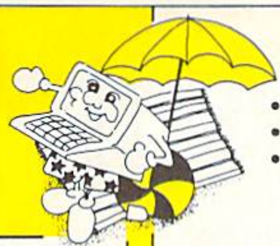
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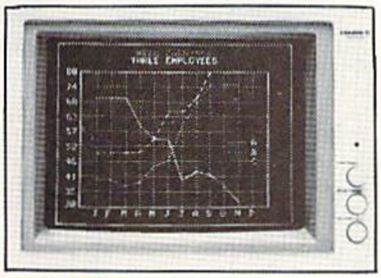
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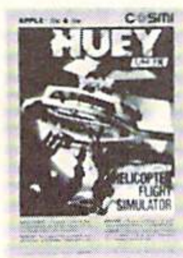
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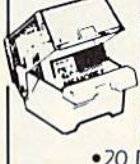
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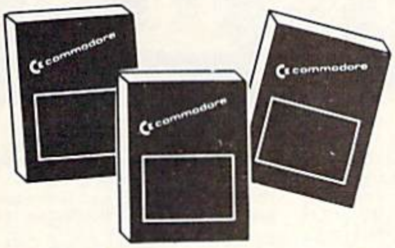
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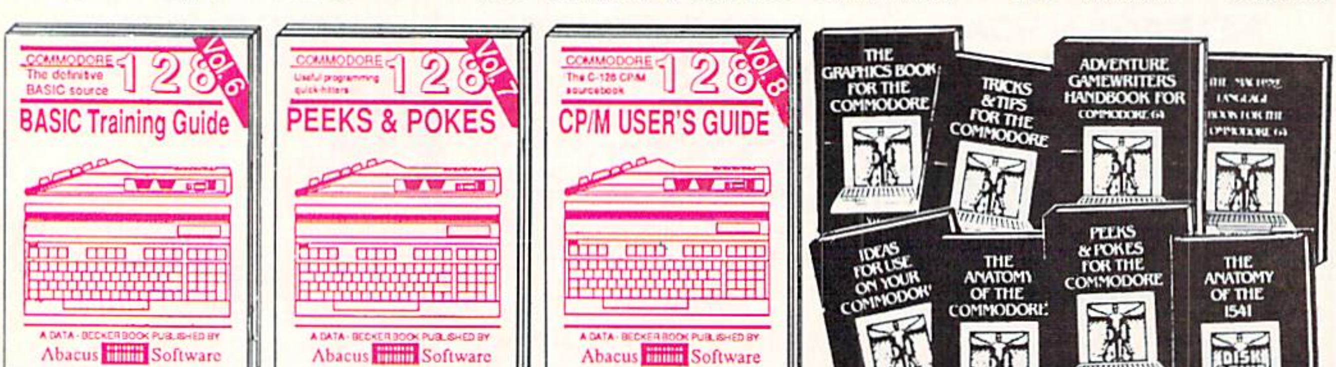
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VIEW FROM THE BRIDGE

Most months, the diversity of features offered in *Ahoy!* defies categorization into a "theme." This issue is an exception. By the time you've finished it, you'll be able to hold your own in any cocktail party discussion on programming languages for Commodore computers!

• Cheryl Peterson begins a series of Cadet's Columns on assorted programming languages with this month's guide to *Moving Up From BASIC to Pascal.* Next month: COMAL. (Turn to page 79.)

• Mark Andrews' *Commodore Roots* continues examining what also amounts to a new language: assembly on the C-128. Perfect for reading on the beach, this month's second installment of *Commodore 128 Graphics* covers *Making a Wave in 40 Columns.* (Turn to page 26).

• The second half of Morton Kevelson's look into the *Heart and Soul of the Amiga 1000* focuses on the software supplied with the machine, including the many *Workbench* utilities, *AmigaDOS*...and, in keeping with our theme, *AmigaBASIC,* which Morton pronounces "(possibly) the most powerful implementation to date of the BASIC programming language." (Turn to page 53.)

• But we haven't snubbed BASIC 2.0 and 7.0. Dale Rupert continues to contort them in undreamed-of ways in this month's *Rupert Report* on *Approaching Infinity,* or using our computers to come to terms with quantities that boggle our human minds. (Turn to page 20.)

We can't remember when we've been as excited as we were when we saw this month's lineup of features. Yes, we can...when we saw last month's lineup of programs!

• You'll *Flap!* your wings to beat the band...the band of mindless drones bent on eliminating you...in the machine language game of the same name. (Turn to page 36.)

• Continuing our quest to computerize all board games that have pieces to lose, we present *Reversi*, its 64 white and black pieces guaranteed for life. (Turn to page 35.)

• Wildlife groups interested in protecting the baby UMs, please do not call us. Their annihilation *is* the goal of *Step On It*...but it's only a game! (Turn to page 39.)

• To insure that this issue is worth your two bucks and change, we've giving you back two bucks...two Buck Childress utilities. *Highlight* helps prevent eyestrain by placing a border behind the screen line on which your cursor is currently resting. (Turn to page 15.) And *Trim* saves you time and memory by eliminating spaces, REMs, or both from your original programs. (Turn to page 64.)

• In the tradition of river rats of old, you'll make a *Meteor Run* for precious Zalium crystals through your planet's asteroid- and meteor-riddled atmosphere. (Turn to page 31.)

• If the thought of cataloging your disk collection causes you to break out in a cold sweat, try *Disk Cataloger,* which will automatically organize and cross-reference your entire disk collection on a single master file. (Turn to page 71.)

You'll imagine the sound of shells exploding around you as you read *Making War on the 64,* wherein Arnie Katz maps out his strategy for playing, enjoying, and winning at military simulations for the C-64. This month's *Entertainment Software Section* also features full-length reviews of *The Infinity Machine, Super Boulder Dash, Alternative Reality (The City), Gulf Strike, Infiltrator,* and *U.S.A.A.F.* (Turn to page 41.)

This issue features an expanded assortment of *Tips Ahoy!*, including short routines for speeding up your 64, extracting audio feedback from your Datasette, incorporating a pause feature into game programs, utilizing the dynamic keyboard technique on the 128, and more. (Turn to page 61.)

If after finishing this programming languages special you don't feel as we do that *Ahoy!* is your best value in a Commodore-specific publication, write us—in any language—and tell us how we can make it that way. We know there must be a few of you left somewhere, and we won't be satisfied until you're marching in the parade with the rest of us.

—David Allikas

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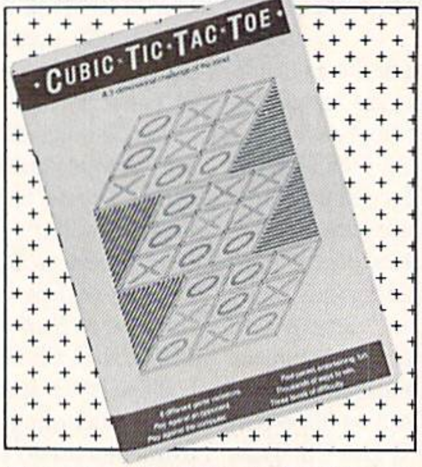
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MicroProse will release a factsheet that will incorporate the April 14th Libya air strike into the Libyan mission section of the Flight Operations Manual provided with *F-15 Strike Eagle.* Provided will be background information and updated map, along with suggestions on using various parts of *F-15's* seven missions to gain insight into the recent raid.

Coming this fall from MicroProse is *Destroyer Escort,* simulating the guarding of a merchant ship convoy from Nazi U-boats and surface raiders in the North Atlantic. And *Gunship*, delayed for almost a year to incorporate new technology, will finally see release in late summer.

MicroProse Simulation Software, 301-667-1151 (see address list, page 14).

From Mindscape comes *Fairlight* ($29.95) for the 64, wherein it is the player's goal as Isvar to find the Book of Light and restore the once-beautiful land of Fairlight to its former glory. And adapted for the Amiga are *The Halley Project: A Mission in Our Solar System* ($44.95), *Deja Vu: A Nightmare Comes True!* ($49.95), and *Keyboard Cadet* ($39.95).

Mindscape Inc., 312-480-7667 (see address list, page 14).

Epyx is commemorating the 30th anniversary of Godzilla with *The Movie Monster Game,* starring the King of the Monsters. The C-64 game was scheduled at press time for June release.

Epyx, Inc., 408-745-0700 (see address list, page 14).

New for the 64 and Amiga from Activision:

Murder on the Mississippi ($39.95) takes the C-64 gamer on an investigation of a riverboat in search of a murderer. British sleuth Sir Charles Foxworth and his companion Regis Phelps must comb the boat's four decks and twenty-four rooms, where they will cross-examine eight suspects. The illustrated text adventure is completely joystick driven.

The Amiga adaptation of *The Activision Little Computer People Discovery Kit* ($49.95) features a refurnished model of the 2½ story house into which the user attempts to lure the Little Computer People living inside his computer, where they can entertain, communicate with, and play games with their host. Each room features added detail and fixtures; for example, an organ that plays multiple combinations of sounds in place of a piano.

In addition, purchasers of the product can win a trip down the Mississippi by returning the form found inside specially marked packages and on display at participating dealers.

For the 64 from Activision's Gamestar subsidiary, *GBA Championship Basketball: Two-on-Two* ($34.95) gives the player control of two teammates who can run plays and select from a wide range of shots. Included are provisions for practice sessions, head-to-head two-on-two games with another human, and league competition in the 23-team Gamestar Basketball Association.

Activision, Inc., 415-960-0410 (see address list, page 14).

Cubic Tic-Tac-Toe ($29.95) tests C-64 owners' ability to think in three dimensions. X's and O's can be aligned horizontally, vertically, or diagonally, with double and triple Tic-Tac-Toe's possible in a single turn. Included are six different game levels, each subdivided into three levels of difficulty.

Brown-Wagh Publishing, 408-395-3838 (see address list, page 14).

World Karate Championship for the C-64 sends players to eight different locations around the world for competitions against the computer or another player. Up to 17 moves, from punches and blocks to forward flips and spinning back kicks, are used against opponents ranging from white to black belts. Tests of skill and endurance such as breaking a stack of bricks with the head or dodging a barrage of batons and spears must be passed between competitions to advance to higher levels.

Epyx, Inc., 408-745-0700 (see address list, page 14).

Rush Ventures is introducing in the US five C-64 games previously released in the UK. Rush to solve their first adventure game, *Eureka!* ($24.99)—because the first player who does can win $50,000. You'll

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also have to unravel the riddles in the accompanying booklet, the ultimate goal being to decipher and dial the secret telephone number. The contest was first held in England last year (see March '85 *Scuttlebutt*), its £25,000 grand prize going to a 15-year-old boy.

Other current Rush releases include *Gladiator, View to a Kill, Friday the 13th, Code Name Mat II;* coming are *Eureka II, Live and Let Die—James Bond,* and *Trivial Pursuit—The Computer Game* (all $22.99).

Rush Ventures Inc., 1-800-663-8400 or 617-451-6561 (see address list, page 14).

The latest in Firebird's Super Silver Disk line (two C-64 games in one package for $19.95):

Battle of Britain/Battle for Midway simulates the two famous World War II encounters. *Britain* recreates the geographical area, size, and strength of the Allied and Axis forces and their proximity to each other; from that point on, the strategies, skirmishes, and outcome are determined by the player rather than history. *Midway* makes the gamer the commander of the U.S. Pacific fleet six months after the attack on Pearl Harbor.

The Arc of Yesod/The Nodes of Yesod are both lunar-based action/adventures, with the former pitting the player against numerous obstacles in his quest to locate and destroy a device buried deep in the caverns of the moon, and the latter offering several twists on that scenario.

The latest in Firebird's Gold Disk series is *Colossus Chess IV* ($34.95), featuring multiple difficulty levels and an understanding of all rules of chess including underpromotions, the 50-move rule, and all draws by repetition. Two- and three-dimensional video displays are supported, and provisions for saving games in progress and recreating previous board settings are included.

Finally from Firebird, *Frankie Goes To Hollywood* ($34.95) for the 64 assigns you over 60 tasks in your journey from Mundanesville through the Pleasure Dome and your quest to become a complete person, ranging from the trivial to heroic feats of skill and intelligence. When you've amassed 87,000 pleasure points and are a 99% complete person, you may search for the Special Door which leads to the Ultimate Experience at the heart of the Pleasure Dome.

Firebird, 201-934-7373 (see address list, page 14).

The following for the 64 from IntelliCreations, Inc., each $29.95:

Based on the book and film of the same name, *The Never Ending Story* sends the hero Atreyu and Falkor, the luck dragon, against the trials and terrors of the ever-consuming "nothing" in the land of Fantasia.

Mind Pursuit tests intelligence and trivia knowledge with true/false, multiple choice, and fill-in questions for adults and children. Add-on disks are $14.95 each.

221 B Baker Street sends the player, as Sherlock Holmes, through the streets and alleys of London in search of clues to solve 30 different cases. Two additional disks, each containing 30 more cases, are $14.95 each.

Crosscheck, based on the board game, requires up to four players to build a continuous word chain from the center of their board out to their respective home bases. Additional disks with new word clues are $14.95 each.

Mercenary, a combination flight simulator/adventure game in 3D vector graphics, casts the player as a 21st century soldier of fortune who has crash landed on the war-torn planet, Targ. He must acquire a craft to escape, while weighing offers for his services from both warring factions.

IntelliCreations, Inc., 818-886-5922 (see address list, page 14).

Two for the 64 from Mindscape, each $29.95:

Bop'N Wrestle, in its solitaire version, tosses the player (as the 10th-ranked Gorgeous Greg) into the ring against the top nine contenders for the world championship. In the two-player version, each contestant picks a persona from among the ten, who range from Molotov Mike to L.A. Bob.

As a magician's apprentice armed with some fireballs but little experience, *Spell of Destruction* requires you to enter the Castle of Illusions, find the Prime Elemental, and destroy it with a single spell. On your way you'll visit over 70 locations with scrolling 3D graphics.

Mindscape, 312-480-7667 (see address list, page 14).

Coming from Accolade are *Ace of Aces,* a World War II combat simulation, and *Deceptor,* an arcadelike adventure based on the Transformers concept. More details will be provided next month.

Accolade, Inc., 408-446-5757 (see address list, page 14).

AMIGA-READY MONITORS

Intending to start sending them home with Amiga users, Thomson has added the ability to receive RGB analog input and display up to 4096 colors to five of their color monitors: the CM31481VI, CM36512VI, CM36-432SI, CM36382SI, and CM31311SI. Analog output can be selected via a switch incorporated into each monitor's front controls.

Free Spirit Software, Inc.

Music of the Masters - $9.95
One full hour of classical music on disk for the C64 or C128 in 64 mode. Screen commentary on the various composers. Mozart, Handel, Beethoven & many more!

Music of the Master, Volume II - $9.95
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BASICally SIMPLE 64 - $14.95
How to use all C64 Basic 2.0 commands and operators in Basic programs. Everything explained in clear, concise terms. After you become an expert programmer, this disk makes a handy reference guide.

BASICally SIMPLE 128 - $19.95
How to use all C128 Basic 7.0 commands and operators in Basic programs. Instruction in graphic, sound and music commands included. Hundreds of easy to follow examples provided on this 128 mode disk.

TECHNIQUE! - $19.95
Easy, direct instruction in programming graphics, animation, sound and music on the C64. Disk includes machine language music program, several tunes and an example game.

Free shipping & handling for U.S. orders! Illinois residents add 7% sales tax. Send check or money order to:

Free Spirit Software, Inc.
5836 S. Mozart
Chicago, Illinois 60629

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Thomson has also released the 15" VM3801DA/DG monochrome monitors, which support 132-column displays and transform color signals into 16 shades of amber (DA; $209) or green (DG; $199).

Thomson Consumer Products Corporation, 213-568-1002 (see address list, page 14).

ABACUS 128 PROGRAMS

Two C-128 releases from Abacus, each $59.95:

Cadpak-128, an enhanced version of Abacus' C-64 drawing and design package (see review in June *Ahoy!*), features accurately scaled output, accupoint positioning, four-screen detail, and support for any high-quality light pen.

Super C Version 3 ($59.95), also an upgrade of the C-64 version, has complete implementation of K&R definition and includes both graphics and math libraries, RAM disk support, Unixlike "shell" and machine language interface.

Also coming for the 128 is *Super Pascal,* plus two books: *128 Peeks & Pokes* and *128 Basic Training Guide.*

Abacus Software, 616-241-5510 (see address list, page 14).

DIGITAL MASTERS

Music of the Masters, Volume II ($9.95) contains 40 compositions by Mozart, Brahms, and other noted longhairs. Instrument simulation includes piano, harpsichord, violin, flute, guitar, and clarinet. Price is $9.95, or $16.95 for Volumes I (see June *Scuttlebutt*) and II (postpaid).

Free Spirit Software, Inc., 312-476-3640 (see address list, page 14).

ONE-MEG AMIGA

Cardco's aMEGA board ($549.95) offers a million bytes of memory expansion for the Amiga, plus pass-through design (allowing connection to expansion port for additional memory, cards, boards, etc.), full auto configuration (operates with both Amiga's AutoConfig and AddMem memory enhancement software systems), multitasking fast RAM (all million bytes are in fast RAM area for high-speed, transparent multitasking), and relocatability (full megabyte can be moved anywhere in contiguous free memory by software command). Use of CMOS IC's eliminates the need for external power.

Cardco, Inc., 316-267-6525 (see address list, page 14).

21 SECOND BACKUP

The one-keystroke *21 Second Backup* is made a reality by menu-driven software and a hardware connection for the 64 and 1541 (transparent when not in use) that allows data transfer at over 10 times the normal rate. An unprotected disk can be copied in 21 seconds with two drives (or 21 seconds plus swapping time with a single drive), moderately protected disks in about 36 seconds, and heavily protected disks in about 45 seconds, including automatic formatting, disk analysis, error reproduction, half-tracking, gapping, fat tracks, and bit density. Software updates that will allow users to duplicate the latest protection schemes using the same hardware will be made available on a regular basis.

VG Data Shack, (see address list, page 14).

TEACHER SUPPORT GROUP

Educators interested in a nationwide distribution center for C-64 educational software are invited to contact Ricky Brewer, a junior high school teacher attempting to establish a non-profit exchange group, at P.O. Box 215, Midway, TX 75852.

MICROLINE 192 REBATE

Okidata has announced a $50 rebate on its $499 Microline 192 printer (see review, Nov. '85 *Ahoy!*). Coupon can be obtained at retailers or by phoning 1-800-OKIDATA.

Okidata, 609-235-2600 (see address list, page 14).

AMIGA FONTS

Futureware Fonts provides larger typefaces for Amiga users involved in video titling, graphics, desktop publishing, and other applications. Purportedly more legible in hi-res mode than fonts provided with the *Workbench* disk, they are compatible

COMPARE

C64 COMAL 2.0 / C64 COMAL 0.14 / C64 BASIC 2.0

x = included
- = not included

==SPRITES=============
x x - Keywords for defining sprites
x x - Keywords for setting sprite color
x x - Keyword for moving sprites
x x - Built in collision detection
x - - STAMP sprite image onto screen
x - - Animate sprites, interrupt driven
x - - Attach sprite shapes to programs
==GRAPHICS===========
x x - Turtle graphics and X/Y graphics
x x - Hi-res or multicolor graphics
x x - Split screen (text/graphics)
x x - Background/border color keywords
x x - Mix text and graphics on screen
x - - Graphics text in any size
x - - Graphics text sideways
x - - Save a graphics screen to disk
x - - Window capabilities
x x - Line clipping within frame
x - - ARC and CIRCLE commands
x x - FILL command
x x - PLOT a point
==SOUND=============
x - - BELL command
x - - Built in sound commands
x - - Control sound envelope
x - - Interrupt driven music built in
==MACHINE LANGUAGE===
x x x Call machine code routines
x - - Call machine code by name
x - - Link machine code to programs
x - - M/L routines parameter passing
==OTHER=============
x - - Modem communications built in
x x - Function keys defined
x - - Function keys alterable by user
x x - Stop key disable / enable
x - - Cursor command
x x - No "garbage collection"
x - - Joystick/paddle/lightpen keywords
x x - Built in string search - IN
x - - Store a text screen for later use
x x - Long variable names
x - - Can sense SRQ interrupt
x x - Can change part of a string
x - - Built in clear screen command
x x x PEEK, POKE, SYS, GOTO

Compare. Even more comparisons are on the opposite page! Check the reviews. COMAL got a straight A rating from the Book of Commodore Software 1985, got the highest 5 star rating from Info Magazine, and got the highest rating of 10 from the Best Vic/ C64 Software review book. Send us a SASE - we'll send you a 24 page COMAL Info booklet.

But why wait! The C64 COMAL 0.14 Programmers Paradise Pak Deluxe is only $24.95 complete with 4 disks FULL of programs, fast loader, disk copier, and over 400 pages of information (add $2 shipping). The top of the line, C64 COMAL 2.0 Cartridge Pak is $98.95 for cartridge, 2 manuals, and 1 disk (add $4 shipping). Canada add $1 extra shipping. US Dollars only. Choose COMAL, the language of choice. Send check, M.O. or VISA/MC numbers to:

COMAL Users Group USA
6041 Monona Drive, Room 111
Madison, WI 53716
phone: 608-222-4432

with *Notepad, Deluxe Paint, Aegis Images,* and other common Amiga software. Each package of 13 fonts includes an install program and font reference booklet. Price is $14.95 plus $1.00 postage.

Classic Concepts Futureware, 206-733-8342 after 5:00 p.m. (see address list, page 14).

COVOX DEMO

A disk of programs and digitally encoded speech vocabularies which demonstrate the audio capabilities of Voice Master (see review in December '85 *Ahoy!*), without the need for the hardware included in the $89.95 package, is available for $5 from Covox. The disk includes a calculator program that talks in English, Spanish, and German, a talking keyboard program, and digitized words and instructions for creating and using vocabularies in the user's own programs with BASIClike statements. Covox, Inc., 503-342-1271 (see address list, page 14).

PUBLIC DOMAIN SOFTWARE

Commodore programs are included among the thousands offered by the National Public Domain Software Center, selling for $4.00 per diskful or renting for seven days for approximately $1.00 per diskful. More information is available via the company's bulletin board (619-749-2741) or 24-hour recorded message (619-727-1015).

National Public Domain Software Center, 619-749-7453; orders 1-800-621-5640 (see address list, page 14).

BULLETIN BOARD

Written entirely in machine language, the *Blue Board* bulletin board system ($69.95) for the C-64 supports over 200 online messages of up to 1023 characters, up to 220 users, and over 25 SYSOP-definable sub-boards. Included are remote SYSOP access, a private SYSOP sub-board, and unlimited session connect time, each of these features password-protected for system security. Also featured are "scribbles," mini sub-boards where messages of 80 characters or less can be used for applications such as opinion forums, voting, chess games. One disk drive and a 300 baud auto-answer modem are required for use.

SOTA Computing Systems Limited, 604-688-5009 (see address list, page 14).

ROM REPLACEMENT

A new Kernal replacement for the stock ROM (U4) in the C-64, *Rainbow ROM* corrects some of the 64's deficiencies with nine built-in DOS 5.1 wedge commands, reassignment of default device to disk and default colors to cyan on black, personalized power-on message, assignment of function keys, and more. 100% compatibility with the original ROM and Epyx *Fast Load* (thought not with datasettes) is claimed. Price is $30 in US, $40 in Canada; for the C-128 in C-64 mode, add $5.00.

Rainbow Electronics, 604-792-3437 (see address list, page 14).

PARALLEL INTERFACE

Teamed with an appropriate cable, the *PPD* software printer driver will permit any Centronics-compatible parallel printer to be driven through the C-64's user port and accessed as though it were a standard Commodore serial printer. Included are many features found in more expensive interfaces, including PETSCII to ASCII character conversion, LISTing mode for BASIC, transparent mode for hi-res bit graphics, and automatic linefeeds, as well as an 8K interrupt-driven print buffer. All features are user-configurable with the included customization program.

The disk is to be distributed as shareware; users are asked to register their copy for $10, for which they will receive additional software and free or inexpensive updates for *PPD.* A registered copy of disk and assembled cable costs $35; with unassembled cable, $25; assembled cable only, $30; unassembled cable only, $10. Canadian orders add $5.00 for shipping; IA residents include 4% state tax.

Drude Micro Services (see address list, page 14).

LITTLE BLACK BOOK

NamePro ($24.95) for the C-64 maintains a database of up to 500 names per disk (with addresses,

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The money-saving subscription rates for *Ahoy!* magazine and the *Ahoy!* program disk are now even lower!

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TOTAL:	$140.40	TOTAL:	$101.90

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Use the postpaid card bound between pages 66 and 67 of this magazine to subscribe. (Canadian and foreign prices are higher.)

The *Ahoy! Disk Magazine* is also available at Walden and B. Dalton's bookstores, as well as other fine software outlets.

phone numbers, and comments) and prints a pocket-sized phone book that can be inserted into an included vinyl cover. The program will also print records on mailing labels (four sizes), Rolodex cards (two sizes), and 8½ X 11" paper. Full categorizing and sorting capabilities are included, as well as a utility for subdividing the database if more than 500 names must be maintained.

Computer Management Corporation, 415-930-8075 (see address list, page 14).

DIGITAL SOUND RECORDER

FutureSound ($175) enables Amiga users to record, play back, and store any sound, with provisions for multitrack recording, stereo playback, and variable recording and playback speeds. Sounds can be accessed from C or BASIC. The system, which connects directly to the parallel port, comes complete with microphone, connecting cables, and recording software.

Applied Visions, 617-488-3602 (see address list, page 14).

ACK-UISITIONS

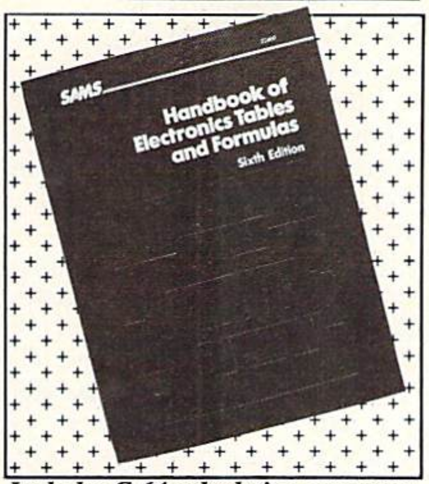
The following items, some old and some new, now being distributed by ACK, Inc.:

• The KCS Power Cartridge ($59.95) interrupts any program to allow screen printing and returns the C-64 user to the program exactly where paused. A $20 cable permits operation with a non-Commodore printer. The Radarsoft database provides 46,000 characters of file storage for the C-64 ($39.95) and 85,000 for the 128 ($59.95).

• Thermal printer, weighing 36 ounces (including a 90-foot paper roll) and measuring 1' X 5½", produces 80-column output with double- and half-size character options, programmable line spacing, and bidirectional print.

• Games: *Floyd the Droid, Endless, Co and Co, Nautilus, Caves of Oberon, Crossword, Bridgemaster* ($39.50 each).

• The time-tested KoalaPad Touch Tablet and *Koala Painter* software ($99.95), and Koala Light Pen



Includes C-64 calculation programs.
READER SERVICE NO. 202

($99.95).

ACK Inc., 415-239-5357 (see address list, page 14).

BOOKS

Covering the C-64's BASIC 2.0 among other versions, *Serious Programming in BASIC* ($14.45 paperback, $21.95 hardbound) is a sourcebook of subroutines and short programs, plus advice and guidance, for use in developing serious application programs.

TAB Books Inc., 717-794-2191 (see address list, page 14).

The expanded sixth edition of *Handbook of Electronics Tables & Formulas* ($19.95) includes C-64 programs for calculating electrical and electronic equations and formulas, including new ones for power units, graphical reactance relations, and more.

Howard W. Sams & Co., 317-298-5723 (see address list, page 14).

For AI students and professionals, *Who's Who in Artificial Intelligence* ($49.95, paperback; $64.95 hardbound) is a reference guide to contemporary research and personalities.

WWAI, 415-965-4561 (see address list, page 14).

AMIGA PROGRAMS

Three productivity packages for the Amiga from Byte by Byte:

Designed for small businesses, the *Write Hand* word processor and form letter generator ($50.00) provides online help, word wrap, bolding, and underlining, and the ability to format

COMPARE

x = included
- = not included

C64 COMAL 2.0	C64 COMAL 0.14	C64 BASIC 2.0	
			==EDITING==
x	x	-	AUTO - automatic line numbers
x	x	-	RENUM - renumber lines
x	x	-	MERGE from disk
x	x	-	Syntax checking on entry
x	x	-	Delete blocks of lines
x	-	-	FIND and CHANGE commands
x	x	-	Pause a program listing
x	-	-	TRACE - to debug your program
x	-	-	'Quote mode' disable / enable
x	-	-	Understands UPPER and lower case
x	-	-	Erase to end of line - CONTROL K
x	-	-	Ooops key - CONTROL A
			==FILES==
x	x	-	Binary sequential/random files
x	x	x	ASCII sequential/random files
x	x	-	Easy one command random file use
x	-	x	GET from disk
x	-	-	Built in true ASCII conversion
			==DISK COMMANDS==
x	x	-	CAT - catalog of files on disk
x	-	-	Pause catalog-send it to printer
x	x	-	STATUS - status of the disk drive
x	-	-	COPY - copy files command
x	x	-	DELETE - scratch files from disk
x	-	-	MOUNT - initialize a disk
x	-	-	RENAME a disk file
x	x	-	Knows when End Of File is reached
x	x	-	CHAIN one program to another
			==NUMBERS==
x	-	-	Accepts Hex and Binary numbers
x	-	x	Includes Logical AND and OR
x	-	-	Includes Logical XOR
x	x	x	Includes Trig functions
x	x	-	Understands TRUE and FALSE
x	x	-	DIV and MOD operators
x	x	-	Arrays with any minimum index
x	x	x	Integer numbers
x	x	-	Produce random integer in a range
			==INPUT-OUTPUT-PRINTER==
x	x	-	TAB works on printer as on screen
x	x	-	Variable size print zones
x	x	-	Print zone-same on printer/screen
x	-	-	Set up default printer types
x	-	-	Built in graphic screen dump
x	-	-	Built in text screen dump
x	x	-	PRINT USING formatted output
x	x	-	Select output: printer or screen
x	-	-	Select input: keyboard/batch file
x	-	-	INPUT AT and PRINT AT
x	-	-	Automatic protected input fields
x	x	-	Allows null reply to input
x	x	-	Allows STOP key during input
x	x	-	Allows comma as part of input
x	-	-	User definable character fonts
			==STRUCTURES==
x	x	x	FOR loop
x	x	-	Integer FOR loop
x	x	-	REPEAT...UNTIL loop
x	x	-	WHILE...ENDWHILE loop
x	-	-	LOOP...EXIT loop
x	x	-	CASE structure
x	x	-	IF THEN ELSE - multiple lines
x	x	-	Call routines by name
x	-	-	External procedures and functions
x	x	-	Multiple line procedure/function
x	x	-	Parameters with procs / funcs
x	x	-	LOCAL or GLOBAL variables
x	-	-	ERROR HANDLER - trap errors
x	x	-	Automatic indenting of structures

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documents and review or merge files while editing.

InfoMinder ($89.95) provides instant access to reference information stored within the Amiga. Any number of data files can be accessed, up to seven at a time.

The *Financial Plus* business accounting system performs general ledger, accounts payable, accounts receivable, and payroll functions. It organizes files, carries out double-entry computations automatically, and prints professional financial statements.

Byte by Byte, 512-328-2985 (see address list, page 14).

SHORTWAVE DATABASE

The *Shortwave Programs Database* for the C-64 covers the schedules of 43 stations in the North American (English) listening area, with a capacity of 8000 programs. Programs are listed by station, time, and type (20 classifications), and frequencies by station, time, and sequential quick scan. Included is a built-in editor and a separate programs editor for setting up files for each station on separate disks.

Price of the disk for first-time users is $15 ($7 for printout), and $7 for updates, by check or money order payable to Ronald Pokatiloff, 2661 Sheridan Rd., Zion, IL 60099 (phone: 312-872-3633).

NEW STAR

Star Micronics' NL-10 dot matrix printer ($319.00) offers draft quality

Continued on page 70

COMPANIES MENTIONED IN SCUTTLEBUTT

Abacus Software
P.O. Box 7219
Grand Rapids, MI 49510
Phone: 616-241-5510

Accolade, Inc.
20863 Stevens Creek Blvd.
Cupertino, CA 95014
Phone: 408-446-5757

ACK Inc.
655 John Muir Drive, E411
San Francisco, CA 94132
Phone: 415-239-5357

Activision, Inc.
and **Gamestar**
2350 Bayshore Frontage Rd.
Mountain View, CA 94043
Phone: 415-960-0410

Applied Visions
15 Oak Ridge Road
Medford, MA 02155
Phone: 617-488-3602

Brown-Wagh Publishing
100 Verona Court
Los Gatos, CA 95030
Phone: 213-936-5729

Byte by Byte
3736 Bee Cave Rd., Ste. 3
Austin, TX 78746
Phone: 512-328-2985

Cardco, Inc.
300 S. Topeka
Wichita, KS 67202
Phone: 316-267-6525

Classic Concepts Futureware
P.O. Box 94276
Richmond, BC
Canada V6Y 2A6
Phone: 206-733-8342

Computer Management Corporation
2424 Exbourne Court
Walnut Creek, CA 94596
Phone: 415-930-8075

Covox, Inc.
675-D Conger St.
Eugene, OR 97402
Phone: 503-342-1271

Drude Micro Services
P.O. Box 533
Cedar Falls, IA 50613

Epyx, Inc.
1043 Kiel Court
Sunnyvale, CA 94089
Phone: 408-745-0700

Firebird Licensees, Inc.
74 North Central Avenue
Ramsey, NJ 07446
Phone: 201-934-7373

Free Spirit Software, Inc.
5836 S. Mozart
Chicago, IL 60629
Phone: 312-476-3640

Gamestar, Inc.
(see **Activision**)

Howard W. Sams & Co.
4300 W. 62nd Street
Indianapolis, IN 46268
Phone: 317-298-5723

IntelliCreations, Inc.
19808 Nordhoff Place
Chatsworth, CA 91311
Phone: 818-886-5922

MicroProse Simulation Software
120 Lakefront Drive
Hunt Valley, MD 21030
Phone: 301-667-1151

Mindscape
3444 Dundee Road
Northbrook, IL 60062
Phone: 312-480-7667

National Public Domain Software Rental Center
1533 Avohill Drive
Vista, CA 92084
Phone: 619-749-7453

Okidata
532 Fellowship Road
Mt. Laurel, NJ 08054
Phone: 609-235-2600

Rainbow Electronics
45421 Airport Road
Chilliwack, BC
Canada V2P 7K3
Phone: 604-792-3437

Rush Ventures Inc.
Box 8079
Blaine, WA 98230
Phone: 1-800-663-8400
or 617-451-6561

SOTA Computing Systems Limited
213-1080 Broughton Street
Vancouver, BC
Canada V6G 2A8
Phone: 604-688-5009

Star Micronics, Inc.
200 Park Avenue, Ste. 3510
New York, NY 10016
Phone: 212-986-6770

TAB Books Inc.
Blue Ridge Summit, PA
17214
Phone: 717-794-2191

Thomson Consumer Products Corporation
5731 West Slauson Avenue, Suite 111
Culver City, CA 90230
Phone: 213-568-1002
or 800-325-0464

WWAI
P.O. Box 620098
Woodside, CA 94062
Phone: 415-965-4561

V.G. Data Shack
5625 Grande-Allee Blvd.
Local 05
Brossard, Quebec
Canada J4Z 3G3

HIGHLIGHT HIGHLIGHT HIGHLIGHT

For the C-64

By Buck Childress

"Excuse me while I put my eyeballs back in their sockets."

After staring at a program listing for what seems like an eternity, do your eyes feel like they're gone on vacation? You're looking right at the monitor, but you really don't see the list anymore. Just a bunch of strange little characters staring back at you. Maybe you can see who blinks first! The next time your eyes pack their bags and your brain starts to frazzle, get relief with *Highlight.*

Highlight not only makes it a breeze to examine your program listings, it helps you to concentrate on each line while you're programming (especially important when the gray matter starts to overheat). Whatever program line your cursor happens to be resting on will be highlighted in the color of your choice, while the rest of the text is a contrasting color, also of your choosing. As an example, if you used *Highlight's* initial setting of black and white, the program line your cursor is on would be white and the other text black.

After saving a copy of *Highlight,* run it. The loader will POKE the machine language data into memory and check for errors. After the data is loaded, type SYS 53000 and press RETURN. That's all there is to it.

Highlight detects when the cursor is resting on a numbered program line and highlights it. If the cursor is on a black line, it will flash the highlighted color in anticipation of your entering a program line. Should you begin entering a direct mode command, such as LIST, the cursor and printed characters will change to the other text color. At a glance you'll be able to tell what's going on and where you're at. Your lists will take on personality. No more monotonous lines coldly imprinted on your screen!

The function keys allow you to change colors whenever you want. Fl changes the color of the line your cursor is on. F3 changes the color of the other text. You can also change the screen background and border colors (they're initially set to light blue) by pressing f5 or f7 respectively. Pressing the SHIFT and function keys together changes the colors in reverse order. You won't be able to change colors if you're in quote, insert, or reverse mode. This lets you use the function key graphics in your program.

You can load, save, and work on all the BASIC programs you want without disturbing *Highlight.* If you want to RUN your program, deactivate *Highlight* first by pressing RUN/STOP-RESTORE. SYS 53000 will reactivate it.

Give *Highlight* a try. It really takes the strain off the ol' eyeballs and helps prevent mental meltdown. □

SEE PROGRAM LISTINGS ON PAGE 94



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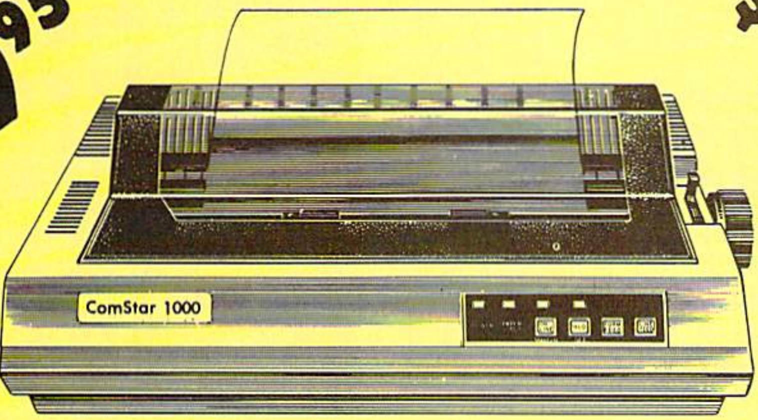
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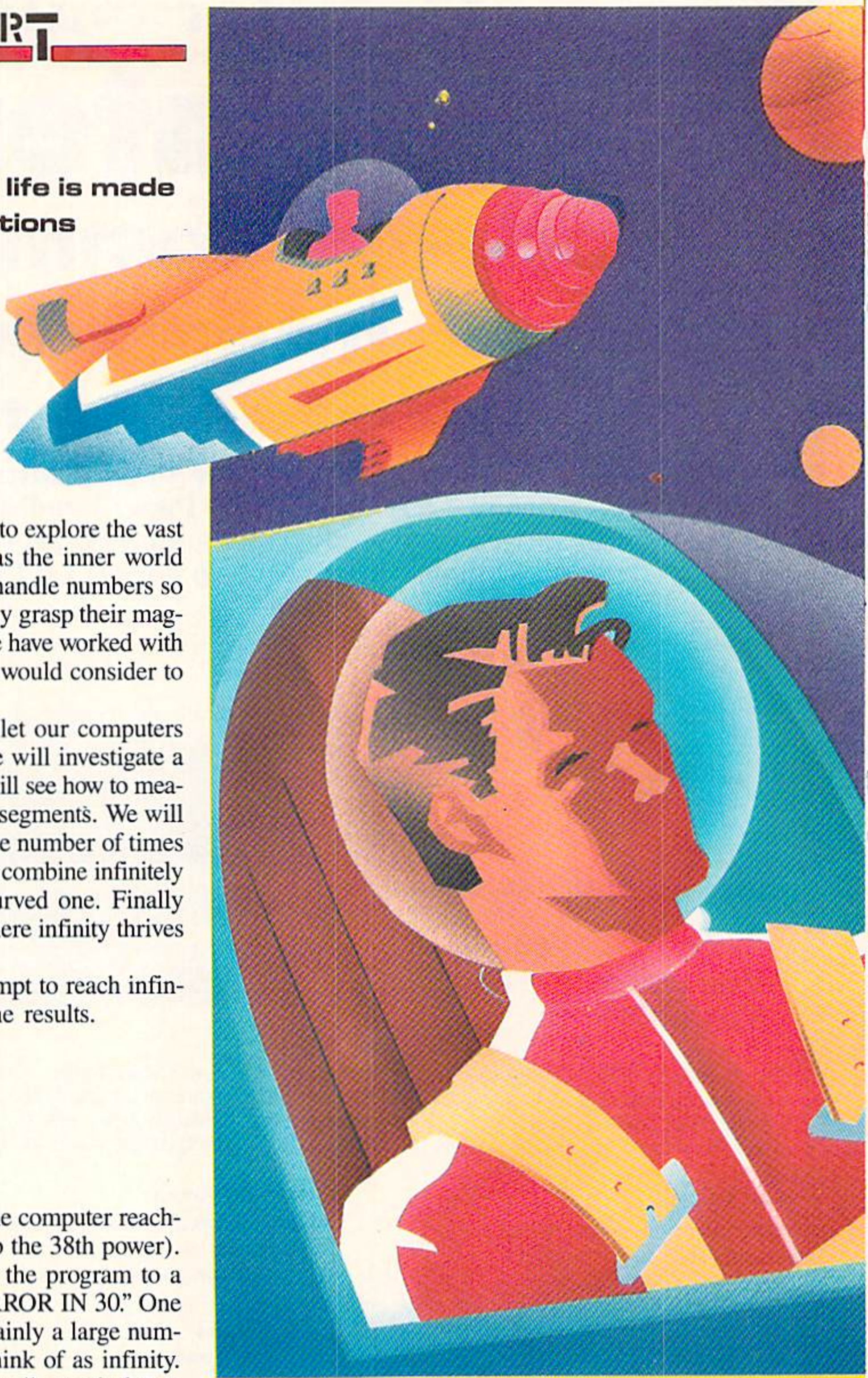
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RUPERT REPORT



The happiness of life is made up of minute fractions ...the countless infinitesimals of pleasurable and genial feeling.—Samuel Taylor Coleridge, 1828

We have used our home computers to explore the vast expanse of the solar system as well as the inner world of molecules at play. Our computers handle numbers so large and so small that we cannot really grasp their magnitudes. Still the range of quantities we have worked with is miniscule compared with what we would consider to be infinite.

Are there any meaningful ways to let our computers deal with the infinite? This month we will investigate a few ways of approaching infinity. We will see how to measure a line built from infinitely many segments. We will remove water from a bucket an infinite number of times without emptying the bucket. We will combine infinitely many straight segments to form a curved one. Finally we will delve into integral calculus where infinity thrives (no graduate school required).

Let's begin with a very simple attempt to reach infinity. Run this program and look at the results.

```
10 D=1
20 PRINT D
30 D=D*10
40 GOTO 20
```

A futile attempt indeed. Before long the computer reaches a value of 1E+38 (one times ten to the 38th power). The next execution of line 30 brings the program to a halt with message "?OVERFLOW ERROR IN 30." One followed by thirty-eight zeroes is certainly a large number, but not very close to what we think of as infinity.

Is it possible to reach an infinitely small quantity? Run the program again after changing line 30 to read

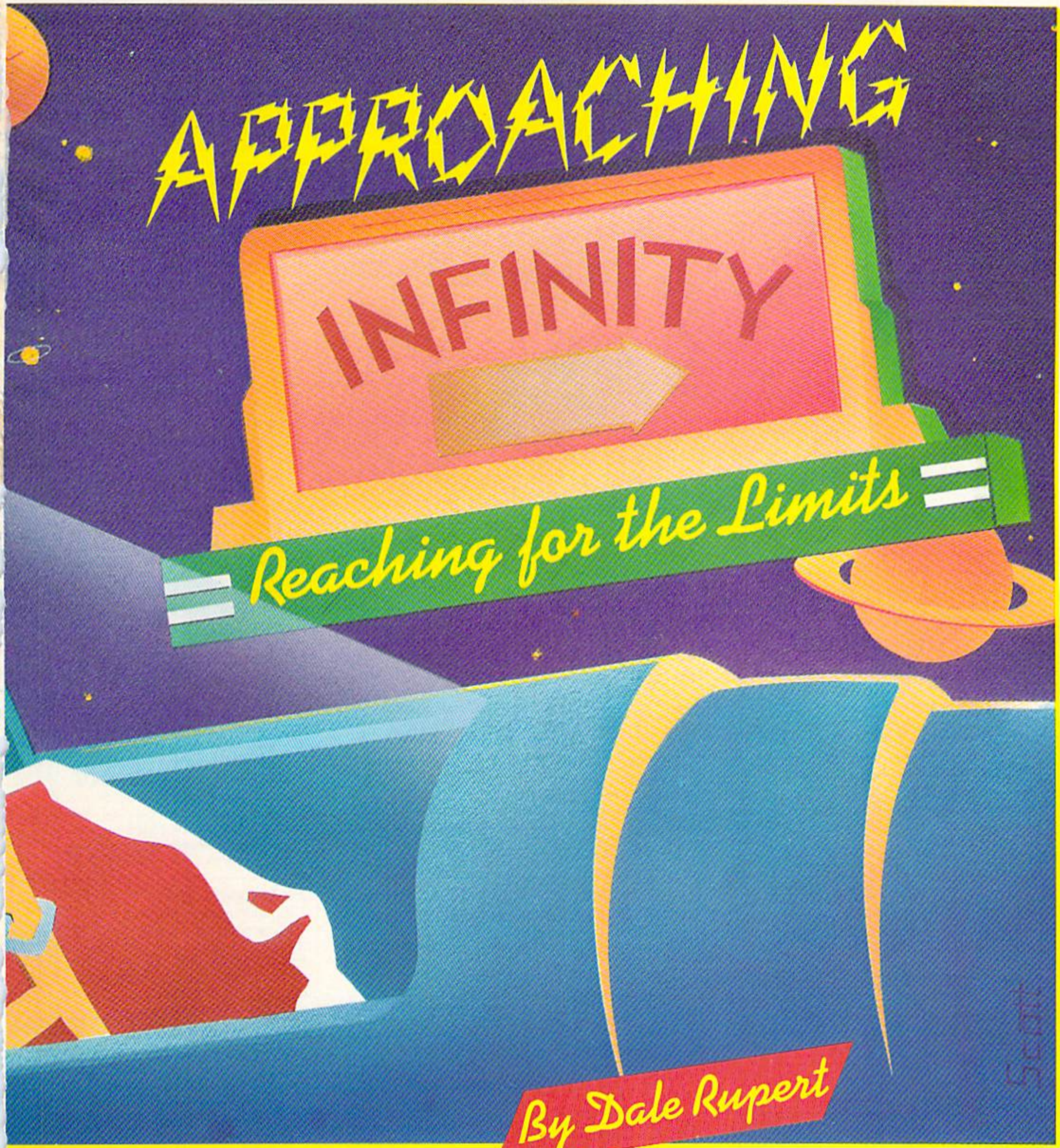
```
30 D=D/10
```

Once the computer reaches 1E−38 (a decimal point followed by thirty-seven zeroes and a one), the program is not able to subdivide the result any further and still distinguish it from zero. The number 1E−38 is minuscule but not infinitely small.

Are we stuck? Is there no way to get closer to infinity? In all the examples we will discuss, it will be apparent that infinity is an approachable, but unreachable, quantity. It might be easier to think of infinity as a limit rather than a quantity.

ON THE LINE

We may not reach infinity, but we can predict the result of performing infinitely many operations. For example, mark off a line segment one foot long. At the end of that line, add a line ½ foot long. Proceed by add-



BOB SCOTT

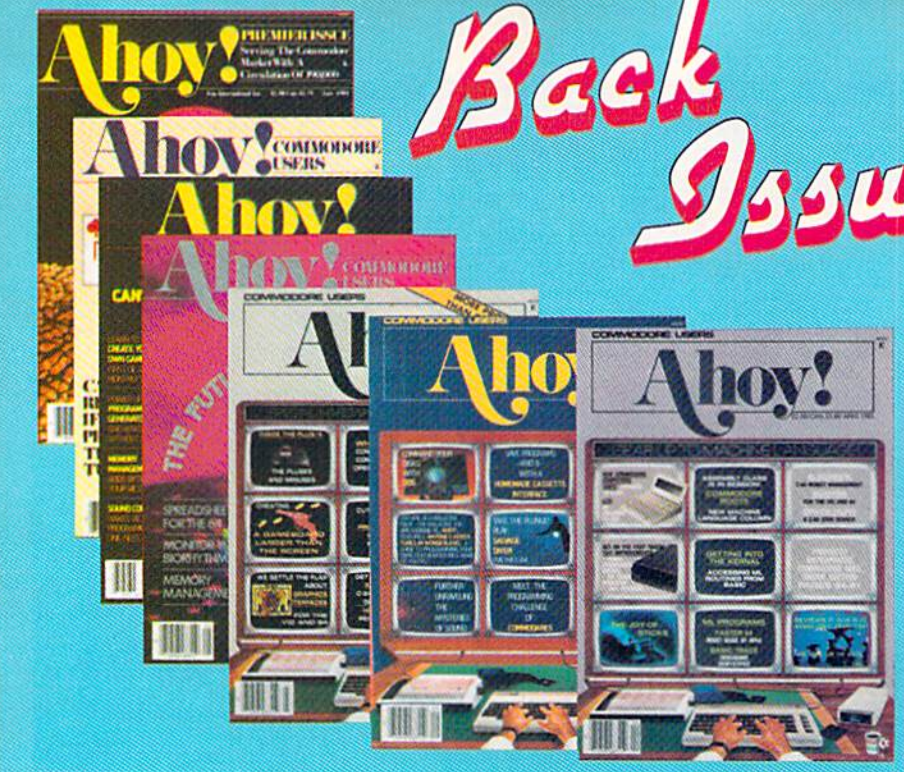
ing ¼ foot, then ⅛ foot, and so forth. In fact, continue this process infinitely many times. How long is the line when you are done (assuming you could finish)?

Let's simulate the operation with this program:

```
10 D=2
20 N=1 : L=0
30 L=L+N
40 PRINT N,L
50 N=N/D
60 GOTO 20
```

D represents the divisor. Each segment added equals the previous length divided by 2. N is the length of the segment currently being added. L is the total length of the line.

The two columns displayed on the screen represent the length of the segment just added and the total length of the line after each addition. For a while it is obvious that the total length is continuously increasing. Once the added segment is smaller than 7E−9, however, the computer



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shows the length as remaining constant with a value of 2.

We know from previous work that the computer can handle only nine significant digits. As we add quantities which affect only the ninth decimal place or beyond, the computer cannot show any difference. From this simple simulation, it is clear that we can predict the outcome of performing infinitely many additions. If the computer could display an unlimited number of significant figures, we would see the total length of the line get closer and closer to the value 2, but never quite reach it.

What happens if each additional line segment is one third as long as the previous one? Change line 10 to D=3 and run it. Is it clear from the display that the line segment now approaches, but never reaches, a length of 1.5?

Remember that even though the computer shows the value 1.5, the actual value is always less. For example, when the added segment is 2.3E−8 feet long, the total length is shown to be 1.499 999 99. The next line segment to be added is roughly 7.7E−9. If you manually add 1.499 999 99 and 0.000 000 007 7, the result is 1.499 999 997 7, which the computer rounds off and displays as 1.5.

Can you predict the length of infinitely many segments added together, each of which is one-fourth the length of the previous one? Change line 10 to D=4 to verify your result.

What if each added segment is only about one percent smaller than the previous one? Will the line become infinitely long or will it approach some limit as before? Change line 10 to D=1.01. This means that the next N equals the previous N divided by 1.01, which is roughly the same as taking 99% (N/1.01 is approximately .99*N). When the program is run, it may not be clear at first that the length of the line will ever reach a limit. Let the program run long enough, and the answer will be obvious.

If we make each segment just one percent larger than the previous one, the results are completely different. Change line 10 to D=.99 and see what happens. In the previous examples, each new term became smaller and smaller. Now each added segment is longer than the last, and the length of the line will increase without bound. After adding infinitely many segments, the line will be infinitely long.

For one final variation on this program, assume that we are removing water from a full bucket. Assume the bucket initially holds 3 gallons. We will remove one gallon, then ½ gallon, ¼ gallon, ⅛ gallon, and so on. Will the bucket ever be empty? Change lines 10 through 30 as follows:

```
10 D=2
20 N=1 : L=3
30 L=L-N
```

Now L represents the total liquid left in the bucket. Disregarding the effects of evaporation, the bucket will still have one gallon in it even after we remove an infinite number of quantities.

CIRCLE FROM A SQUARE

Draw a line segment. Turn 120 degrees and draw another segment the same length. Again turn 120 degrees and draw a third such segment. This one returns us to be starting point, and we have constructed an equilateral triangle.

Start again, but this time turn 90 degrees after drawing each segment. Four such segments leave us with a square. If we make 72-degree turns, the result is a regular pentagon. In general if the number of degrees in the turn is 360/N, an N-sided, equilateral polygon will be created.

What happens as N becomes larger and larger? Those of you with good imaginations should be able to visualize the answer. Those of you with a Commodore 128 may run the following program to see the results.

```
10 GRAPHIC 1,1
20 FOR N=3 TO 50
30 CIRCLE 1,160,100,100,,,,,360/N
40 CHAR 1,0,0,STR$(N)
50 NEXT N
60 GETKEY A$ : GRAPHIC 0
```

Press any key after the 50-sided figure has been drawn to return to the text screen. If you press RUN STOP before the end of the program, enter f1 followed by 0 or type GRAPHIC 0 to return to the text screen.

This program performs the sequence of operations described above. It stops after the number of sides reaches 50. The final quantity in the CIRCLE statement specifies the number of degrees to turn after drawing each segment. The fact that we use a CIRCLE statement gives away the answer: as the number of sides becomes infinitely great, the polygon becomes a circle. The length of each segment approaches zero as does the angle of rotation after each segment.

This points out one of the paradoxical aspects of infinity. Infinitely many rotations of an infinitely small line segment through an infinitely small angle generates a circle of finite size.

INTEGRAL CALCULUS

The quotation from the English Romantic poet Coleridge at the start of this article describes the happiness of life in a way that a mathematician might describe the

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calculus of integration. Integral calculus (or integration, as it is called) involves finding the amount of area bounded by the graph of a function. The process of finding the area is equivalent to dividing that area into infinitely many rectangles, and adding their areas together.

We will develop a computer program to perform integration. The program will run on any computer. For the C-128, we will create a graphical presentation of the process. On the C-64 or VIC, only the numerical results will be displayed. Refer to the program *The Integrator* on page 87. As written, *The Integrator* integrates one quarter of a circle with radius 150. The function defining a circle is given in line 200:

```
DEF FNA(X) = SQR(R*R - X*X)
```

where R is the radius of the circle. This function gives the value of Y for any given value of X. Line 90 calls this subroutine to define the function and to determine over what portion of it to integrate.

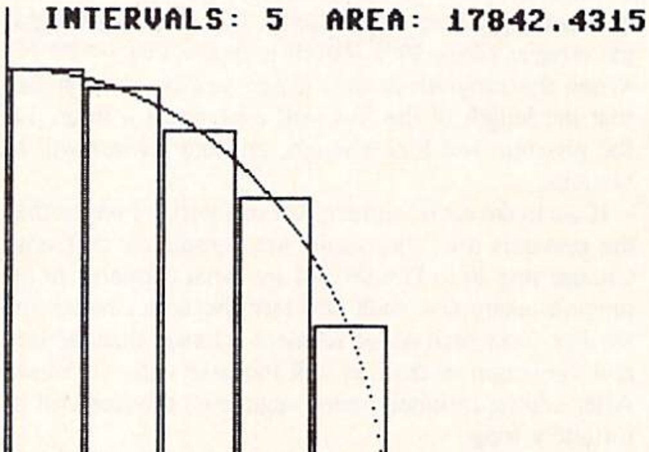
The main loop of the program begins at line 100. The function is plotted (C-128 only) by the subroutine at line 260. The function is subdivided into rectangular intervals and the areas of those rectangles are calculated and added by the subroutine at line 350. The results of this integration are displayed by the subroutine at line 480. Finally, the user is allowed to specify a different number of rectangular intervals, if desired, and the main loop is repeated.

(If your program stops with a ?SYNTAX ERROR IN 300, as my C-128 does the first time after rebooting, just enter RUN and everything should work properly. Can anyone explain that bug?)

The center of the circle is at the origin of the graph, X=0, Y=0. Line 220 specifies the limits of integration. These are the values of X at the left (X0) and right (X1) sides of the area we want to find. On the C-128, a graph of the circle from X equals 0 to 150 will be plotted. The step size between individual values of X to be plotted is specified in line 220 SS=1. Choose SS larger if you want fewer points plotted for faster results. Make SS smaller (e.g., 0.1) to increase the density of the points on the graph.

The program divides the X-axis over the limits specified into N equal parts, where N is initially set to 5 in line 70. The height of the graph (the Y value) at the midpoint of each interval corresponds to the height of a rectangle which will be drawn. There will be N rectangles, each having the same width.

Refer to the figure below, which shows the graph as plotted and subdivided on the C-128. Notice that the area of the quarter-circle is not exactly the same as the sum of the areas of the five rectangles. Parts of the circular area are not covered by a rectangle, and parts of rectangles extend above the circular area. All in all, however, these five rectangles provide a fairly good approximation to the actual area of the quarter-circle.



The computer calculates the sum of the areas beginning in line 360. The midpoint of the interval (X-value) is calculated in line 380. The height (Y-value) of the circle at that midpoint is calculated in line 390. The area of a rectangle is simply height times width, where width is given by DX from line 240. Each area is calculated in line 400, and the sum of the areas is accumulated in line 410.

The logical variable C128 is given the value "true" in line 60 if the program is being run on a Commodore 128. Otherwise it is false. (Refer to February 1986 *Tips Ahoy!*) Lines 430 through 450 are executed only by the

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C-128. These lines draw the individual rectangles.

Once the areas of the rectangles have been summed, the subroutine at line 490 displays the results. On the C-128, the split-screen graphics mode is used with the area of the rectangles shown in the window at the bottom of the screen. The previously calculated area is also displayed as a reference.

Finally, the user is asked to specify a different number of intervals. Specify 0 or less to end the program.

That brings us back to the concept of infinity. We saw earlier that the area of the rectangles is not exactly the same as the area of the quarter-circle. Ideally, if there are infinitely many intervals each of infinitesimal width, the areas of the rectangles will exactly equal the area of the quarter-circle.

The area of the quarter-circle can be calculated from a formula: A=PI*R*R/4. With R=150, this gives a value of 17671.4587. The area calculated for five intervals is shown in Figure 1 to be 17842.4315. Consequently, for this graph at least, we have a result which is within 1 percent of the actual value with only five intervals. Increase the number of intervals and see how close the results come to the actual value.

Of course, this integration method can be used to find areas even if the area formula is not known. For example, change the limits of integration in line 220 to X0=20 and X1=100. Now the area to be calculated is above the X-axis and below the circle, bounded on the left and right by X=20 and X=100. The best way to know how close your answer is to the actual value is to increase the number of intervals until there is no significant change in the results.

Here are some additional things to try. If you prefer to draw the rectangles so they are not filled in on the graphics display, change the 1 at the end of line 450 to 0. This speeds up the drawing process considerably.

Try integrating these other functions by changing the following lines:

```
A) 200 DEF FNA(X) = 75*SIN(X/10) + 75
   220 X0 = 0 : X1 = 300
   230 SS = 2
   450 BOX 1,XU,YU,XL,YL,0,0

B) 200 DEF FNA(X) = SQR(R*R - (X-R)*(X-R
   ))
   220 X0 = 0 : X1 = 2*R

C) 200 DEF FNA(X) = -(X<100)*(X+50) - (X
   >100)*(350-2*X)
   220 X0 = 0 : X1 = 175
```

C-128 users may want to add these lines:

```
45 TRAP 2000
2000 RESUME NEXT
```

to prevent out-of-range plot values from stopping the program. C-128 users should also change the 5 in line 160 to 0 if they normally use the 40-column text screen instead of 80 columns.

This program needs a more flexible plotting capability. Only a small range of functions are plotted "nicely" by this program. A general-purpose plotting program is the topic for another month.

For anyone who uses an Epson MX-80 with Graftrax or comparable graphics printer, the C-128 screen dump routine at line 1000 may be useful. The routine reads the C-128's high-resolution graphics screen and stores it a column at a time in A$. Line 1080 sends "Escape−K CHR$(200) CHR$(0)" followed by the 200 bytes of A$ which the Epson converts to graphics. If your printer uses a different Escape sequence to receive graphics, you may need to convert only line 1080 to include your printer's commands. Once the program has stopped, you may simply type GOTO 1000 to start the screen dump. The image is still in memory starting at address 8192 even if the high-resolution screen is not being displayed.

There are numerous books on infinity, infinite series, and numerical analysis which will provide much more information on the subjects we have discussed. Use your computer as a tool to explore some of the mysteries of the infinite.

We have seen that when dealing with infinity, getting part of the way there can be as useful as going all the way. □ *SEE PROGRAM LISTING ON PAGE 87*

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MAKING A WAVE IN 40 COLUMNS

Commodore 128 Graphics, Part II

By Mark Andrews

If you own a Commodore 128, you don't need anyone to tell you that your computer can generate a spectacular 16-color, 80-column text display. And the same chip that prints 80-column text can generate detailed double high-resolution graphics. Strangely enough, though, not many programmers have used the C-128 to create double hi-res graphics programs. One reason is that the 80-column microprocessor can generate only one screen color in its double hi-res mode, and is thus restricted to a monochrome double hi-res display. Another reason is that the chip operates too slowly to be of much use in programming high-speed arcade-style games.

The chip I'm talking about is the new 8563 VDC, a completely different processor from the familiar VIC-II chip that generates the C-128's 40-column display. The VIC-II chip, which is also used in the C-64, produces a 320 dot by 200 dot screen that can be used either for standard high-resolution graphics or for a 40-column text display. The 8563 chip has a screen resolution of 640 dots by 200 dots, and can therefore generate either double hi-res graphics (high-resolution graphics with twice the horizontal resolution of normal hi-res graphics) or an 80-column text display.

Unfortunately, the 8563 has to pay a price for all that horizontal resolution—and that price, as mentioned, is speed. The chip spends so much of its time creating a double high-resolution display 60 times each second that it doesn't have enough time left to handle fast-action graphics operations at arcade-game speeds. Because of this limitation, the engineers who designed the C-128 decided not to spend much time figuring out how their new 80-column chip could be used for high-resolution graphics displays. In fact, BASIC 7.0 (the version of BASIC built into the C-128) doesn't even offer any double high-resolution graphics commands. If you know how to use C-128 assembly language, of course, you *can* write eye-catching, if slow-moving, double high-resolution graphics programs for the C-128—and we'll do just that in future columns. First, though, let's take a close look at some programs designed to show how the C-128 can be programmed to create a standard (40-column) high-resolution graphics display.

HI-RES PROGRAMS IN BASIC

The first listing on page 87, titled MAKEWAVE.BAS, is a BASIC program designed to be run using the C-128's standard high-resolution mode. If you've written high-resolution graphics programs for the Commodore 64, you'll notice that MAKEWAVE.BAS contains many instructions that could also be used in a C-64 program. But, because of the C-128's bank-switching architecture and a number of other special features, there are also some important differences between Commodore 128 programs such as MAKEWAVE.BAS and similar graphics programs written for the Commodore 64.

PLOTTING A BIT-MAPPED DOT

A C-128 hi-res screen, like a C-64 hi-res screen, uses what's often referred to as a bit-mapped display—a display in which each dot on the screen can be individually controlled. In its 40-column hi-res mode, the C-128—just like the C-64—generates a bit-mapped display that measures 320 dots wide by 200 dots high.

To plot a dot on a bit-mapped screen, a program written for either the C-128 or the C-64 has to use a rather complicated formula. One such formula appears in line 200 of the MAKEWAVE.BAS program. I've explained how this algorithm works in previous columns, and a detailed explanation can also be found in my book *Commodore 64/128 Assembly Language Programming* (Sams, 1985). So instead of explaining the formula again here, I'll examine some of the other features of the MAKEWAVE.BAS, particularly those that distinguish it from similar programs written for the 64.

As explained last month, the C-128 comes with 128K of RAM and almost 48K of ROM installed. To help the programmer address all that memory, the computer is equipped with 15 preset memory configurations called banks. Of these 15 banks, there are four that are of paramount importance: banks 0, 1, 14, and 15.

THE BASICS OF BANK-SWITCHING

Banks 0 and 1 are RAM banks. When the C-128 is running a BASIC program, the computer ordinarily stores the program's text in bank 0, and places a table of the variables which the program uses in bank 1. Banks 14 and 15 are ROM banks. The C-128's BASIC interpreter resides in bank 15, and bank 14 is where the data used to generate screen characters is stored.

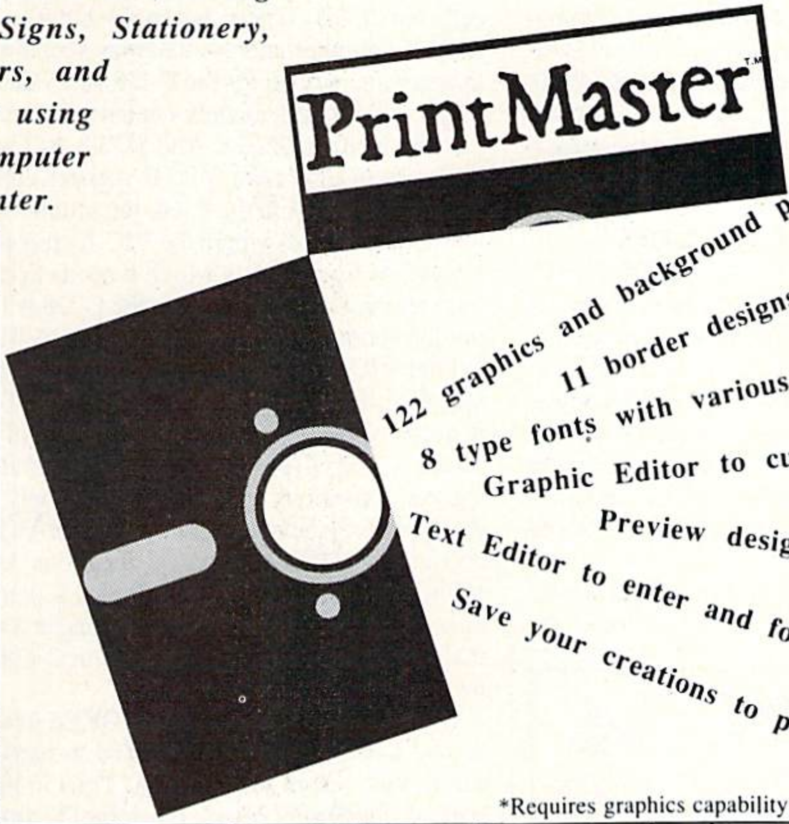
When a BASIC program is stored in bank 0, the normal location for BASIC programs, its text will ordinarily start at memory address $1C00. However, as you know from the memory maps that appeared in last month's column, the block of memory that starts at $1C00 is also used as screen memory when the C-128 is in its 40-column hi-res mode.

Since a BASIC program and a high-resolution screen can't occupy the same RAM space at the same time, the

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Blue Chip; Citizen MSP-10, and MSP-20; C.Itoh Prowriter 8510, and Prowriter Jr.; Data Products SPG 8010-2, 8012, 8021, 8022, 8051, 8052, 8071 and 8072; EPSON FX, JX, LX, RX, LQ-1500, and MX with Graftrax; HP Think Jet; IBM Color Dot Matrix, Compact Thermal, Graphics Printer and ProPrinter; IDS Prism; Mannesmann Tally MT 85 and 86; NEC P2/P3 Pinwriter, 8023A and 8027; MPI Sprinter; Okidata 82A/83A with Okigraph 1, 84 (Step II), 92, 93, 182, 183, 192, 193, and Okimate 10 and 20; Panasonic KX-P 1090, 1091, 1092, and EP-1505; Star Gemini 10 and 15; Tandy CGP 220, DMP 105, 130, 200, 400 420, 430, 500, 2100, 2100P and 2200; TI 855; Toshiba 1340, 1350, 1351 and P351; Smith Corona D300.

Printers supported on the Apple version:
Apple Imagewriter and Scribe; C Itoh Prowriter 8510; EPSON FX-80/100, RX-80/100, and MX-80 with Graftrax; Okidata 92 and 93; Star Gemini 10 and 15.



Printers supported on the Commodore version:
C.Itoh Prowriter 8510 and Prowriter Jr.; Commodore VIC-1525 and MPS-801; EPSON FX, RX, and MX with Graftrax; Okidata 92, 93, 192, and Okimate 10; Star Gemini 10 and 15.

Printers supported on the Atari version:
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designers of the C-128 provided a handy technique for keeping BASIC programs and high-resolution screen data out of each other's way. But the technique works only if the C-128 is switched to its high-resolution mode using a BASIC 7.0 GRAPHIC command. If a GRAPHIC command is issued to put the C-128 into its hi-res mode, and a BASIC program is in bank 0 RAM when the command is received, the GRAPHIC command will automatically move the BASIC program up from its normal starting address of $1C00 to a new starting address of $4000. And that's where the program will stay, even if another GRAPHIC command is issued to put the computer back into its 40-column text mode.

MAKEWAVE.BAS, LINE BY LINE

Now let's take a close look at the MAKEWAVE.BAS program, beginning with line 20. The first two commands in this line—COLOR 0,1 and COLOR 4,1—are used to set the color of the C-128's screen display. Then the command GRAPHIC 1,1 is used to set up (and clear the screen for) a high-resolution display. As explained above, this command also moves the text of the program up to address $4000, so the program will still be in memory and still be executable when the computer has entered its hi-res mode.

In line 30 of the program, a BANK 0 command is used to take the C-128 out of bank 15—the "home bank" for executing BASIC programs—and to put the computer temporarily in bank 0, the RAM bank in which screen memory resides.

When the switch to bank 0 has been carried out, a POKE instruction is used to place the value 120 (or $78 in hexadecimal notation) into memory location 2604 (or $A2C in hex). Memory address $A2C may not ring any bells with C-64 owners, but in the 128 it's a "shadow register" for another address that may sound more familiar. In programs written for the C-128, any value POKEd into $A2C will be immediately copied into memory address $D018 (decimal 53272). And $D018, as C-64 users may know, is an important VIC-II register called VMCSB.

In the C-128, as in the C-64, the setting of the VMCSB register determines where the VIC-II chip will look when it wants to find the data which it needs to create text and high-resolution screens. When the C-128 is in its high-resolution mode, the four low bits of the VMCSB register tell the VIC chip where screen memory begins, and the four high bits tell VIC where it can find the data that it needs to determine what colors should be displayed on the screen. I've covered the workings of the VMCSB register in previous columns—so I'll simply point out that the POKE command in line 30 of MAKEWAVE.BAS notifies the VIC-II chip, via locations $A2C and the VMCSB register, that it can find a screen map beginning at $2000 and a color map starting at $1C00 (the normal starting address for color maps in C-128 hi-res graphics programs).

After the value $78 has been POKEd into memory address $A2C, the C-128 is returned to bank 15 so that it can run the rest of the program. Then in line 40, an important operation occurs; the value 32 (or $20 in hex) is POKEd into memory address 216 (or $D8 in hex). This operation has no equivalent in C-64 programming, but is of critical importance in hi-res C-128 programs such as MAKEWAVE.BAS.

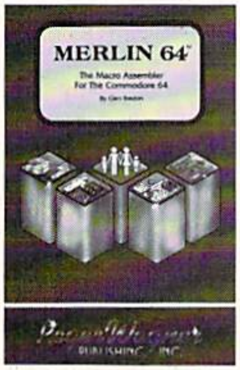
Here's why: In the C-128 (but *not* the C-64), memory location 216 (or $D8) is a flag that determines what kind of display the computer will generate when it is in its 40-column mode. Every 1/60 of a second, the C-128 checks memory address $D8 and immediately goes into whatever graphics mode the flag is set for. And, since the register's default setting is for 40-column text, the C-128 will not stay in its hi-res graphics mode for more than 1/60 of a second unless the default value of memory location $D8 is changed. The settings of the flag are as follows:

DEC	HEX	MODE
224	$E0	GRAPHIC 4 (split-screen multicolor hi-res & text)
160	$A0	GRAPHIC 3 (multicolor hi-res)
96	$60	GRAPHIC 2 (split-screen hi-res & text)
32	$20	GRAPHIC 1 (hi-res)
0	$00	GRAPHIC 0 (text)

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SETTING THE SCROLY REGISTER

The POKE instruction in line 50 is also quite important; but, unlike the POKE in the previous line, this one is also used in C-64 hi-res programs. It sets bit 4 of memory address 53265 ($D011), an important C-64/C-128 register called the SCROLY register. And, in the C-128 as well as the C-64, bit 4 of the SCROLY register is what turns on the computer's bit-mapped 40-column mode.

Now we have come to line 60 of MAKEWAVE.BAS– and from that line on, every instruction in the program would be just as much at home in a C-64 program as it is in this one. In line 60, a BASIC variable called BASE is defined, and its value is set at 8192 (or $2000 in hex). This, of course, is the starting point of the high-resolution screen map that was set up in line 30. In statements 70 through 80, a horizontal line is drawn across the middle of the screen using a standard screen-plotting subroutine that extends from line 170 through line 230. Next, in lines 110 through 140, a sine wave is drawn on the screen using the screen-plotting subroutine in lines 170 through 230 and the standard BASIC function SIN(X). The program ends with an infinite loop in line 150.

Since MAKEWAVE.BAS is written completely in BASIC, it runs quite slowly. One way to improve its speed might be to convert the screen-plotting subroutine which it uses into an assembly language program. Then the subroutine could be assembled into machine language and called from BASIC each time it is needed. This is the approach that is taken in the other two listings provided this month: a BASIC program called MAKEWAVE2.BAS and an assembly language program called PLOTWAVE.S (see pages 86 and 87). PLOTWAVE.S was written on a C-128 running in C-64 mode, using a *Merlin 64* assembler. With relatively minor modifications, it could also be typed and assembled using any other C-64 or C-128 assembler.

HOW THEY WORK

PLOTWAVE.S and MAKEWAVE.BAS are designed to be used together. Each time PLOTWAVE.S is called by MAKEWAVE.BAS, it will plot a dot on the screen. Before PLOTWAVE.S is called, however, the horizontal screen coordinate of the dot to be plotted must be stored in memory addresses $0B02 and $0B03, and the vertical coordinate of the dot must be placed in memory address $0B04. Then PLOTWAVE.S can be called from BASIC using BASIC's USR(X) function.

The PLOTWAVE.S program is similar to several C-64 programs that have appeared in this space. So let's just note that PLOTWAVE.S is an assembly language version of the BASIC dot-plotting subroutine in lines 160 to 230 of the MAKEWAVE.BAS program.

MAKEWAVE2.BAS is also similar to other programs that have appeared in this column. There is one important difference, however, between the way the USR(X) function is used in C-128 programs and in C-64 programs. Before USR(X) is used in a C-64 BASIC program, the starting address of the machine language program which

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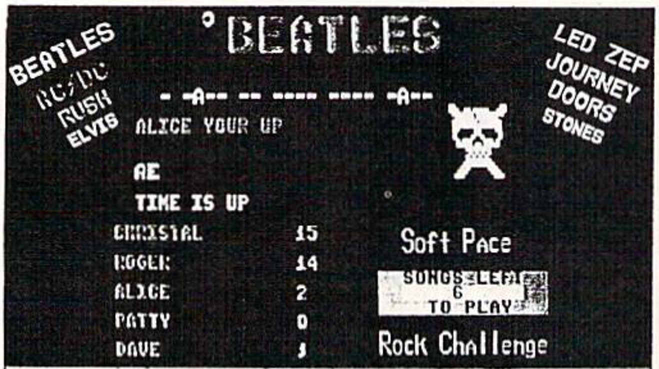
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it calls must be placed in memory registers 785 and 786 ($0311 and $0312 in hex notation). In programs written for the C-128, however, the address of the machine language program must be placed in memory locations 4633 and 4634 ($1219 and $1220 in hex notation).

In line 30 of MAKEWAVE2.BAS, the BASIC function DEC("X") is used to define a pair of BASIC variables called HPSN (for "horizontal position") and VPSN (for "vertical position"). At the same time they are defined, these variables are set to point to memory addresses $0B02 and $0B04, the addresses at which the PLOTWAVE.S program will expect to find its horizontal and vertical screen coordinates when it is told to plot a dot on the screen.

In line 40 of MAKEWAVE2.BAS, a machine language program called PLOTWAVE.O (the object code version of the PLOTWAVE.S program) is loaded into memory, using a standard C-128 technique. First, a variable called A, which initially holds a value of 0, is changed to contain the value 1. Next, an IF...THEN statement is used to load PLOTWAVE.O into memory. PLOTWAVE.O will not load, however, unless the value of A is 0. This technique keeps PLOTWAVE.O from being loaded into memory over and over again, hanging up the C-128 at line 40 of the MAKEWAVE.BAS program.

The construction used in lines 50 and 60—and also in several other lines of MAKEWAVE2.BAS—is another common feature of Commodore BASIC programs which interact with machine language programs. In these two lines, a standard BASIC algorithm is used to load USR(X) pointers 4633 and 4634 with the low and high bytes, respectively, of the address of the PLOTWAVE.O program. At several other places in the program, the same algorithm is used to place other high-byte/low-byte combinations into other memory locations.

Although MAKEWAVE.BAS and MAKEWAVE2.BAS look quite different, they operate in similar fashion. The main difference between them is that while MAKEWAVE.BAS does all of its dot-plotting work in BASIC, MAKEWAVE2.BAS plots its dots by calling the machine language program PLOTWAVE.O.

After you've typed and assembled PLOTWAVE.S, and have typed and saved MAKEWAVE2.BAS, you should be able to execute both programs with a single RUN command. Although MAKEWAVE2.BAS will run faster than its predecessor MAKEWAVE.BAS, it won't run as *much* faster as you may have hoped. That's because the program contains a lot of time-consuming floating-point operations that are performed in BASIC—a process which, as you may know, is notoriously slow. So there's still too much BASIC in MAKEWAVE2.BAS to allow the program to operate much faster than its predecessor.

There is, however, one way to make a dot-plotting program run much faster than either MAKEWAVE.BAS or MAKEWAVE2.BAS. That method is to forget about BASIC altogether, and to write the whole program in assembly language. And that's what we'll do in next month's column. ☐ *SEE PROGRAM LISTINGS ON PAGE 86*

METEOR RUN

For the C-64

By Tony Brantner

In *Meteor Run* you are placed in command of a spaceship searching the planet's surface for Zalium crystals, which are the main source of power for your vessel. This is no simple task, however, since the planet's atmosphere is polluted with asteroids and meteors.

Be sure to have a joystick plugged into Port 2 before running the program. After the ship descends onto the screen, you can move it vertically by simply pressing the joystick up or down. To move the ship horizontally, press the joystick to the left or right. The longer you hold it to one side, the faster the ship will go (up to a certain limit, of course). Pressing the stick to the opposite side causes the ship to slow down, and eventually stop, before changing its direction. Once you reach one of the side limits, the screen will begin to scroll across the planet's surface.

You begin the game with three ships and 30 units of power in reserve, as shown on the bottom of the screen. Meteors will begin to drift around you in different directions, and a collision with one will cost you a ship. When one of them reaches your horizontal line of fire, press the button to destroy it with a laser beam. You are awarded 50 points for each disintegrated meteor, and an additional ship for every 1000 points. A maximum of nine ships can be held in reserve. Any time you need a break, just press the SHIFT-LOCK key to freeze the game.

Moving your ship to the bottom of the screen and pressing the fire button activates a tractor beam. When you come across a cluster of Zalium crystals on the planet's surface (represented by a small yellow mound), move directly over it and press the fire button to transport it to your ship's power supply. 10 units of energy will be added to the meter, which has a maximum capacity of 30. Be sure to keep an eye on the meter, since allowing it to reach the one third mark disables your laser beam and letting it reach empty causes the ship to explode. ☐

SEE PROGRAM LISTING ON PAGE 95

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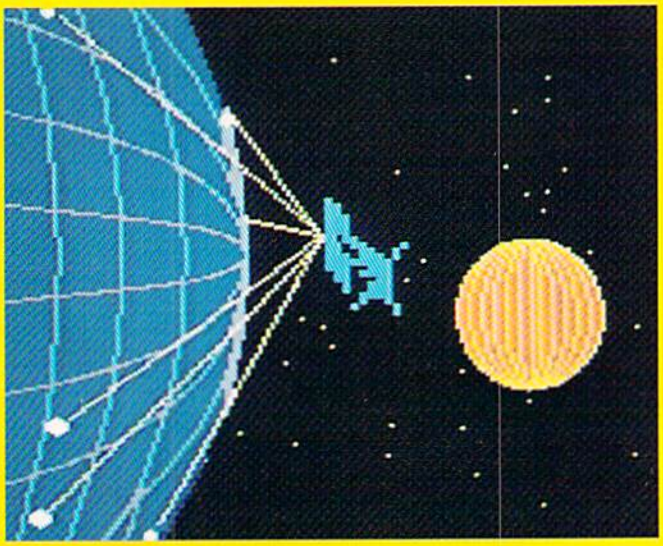


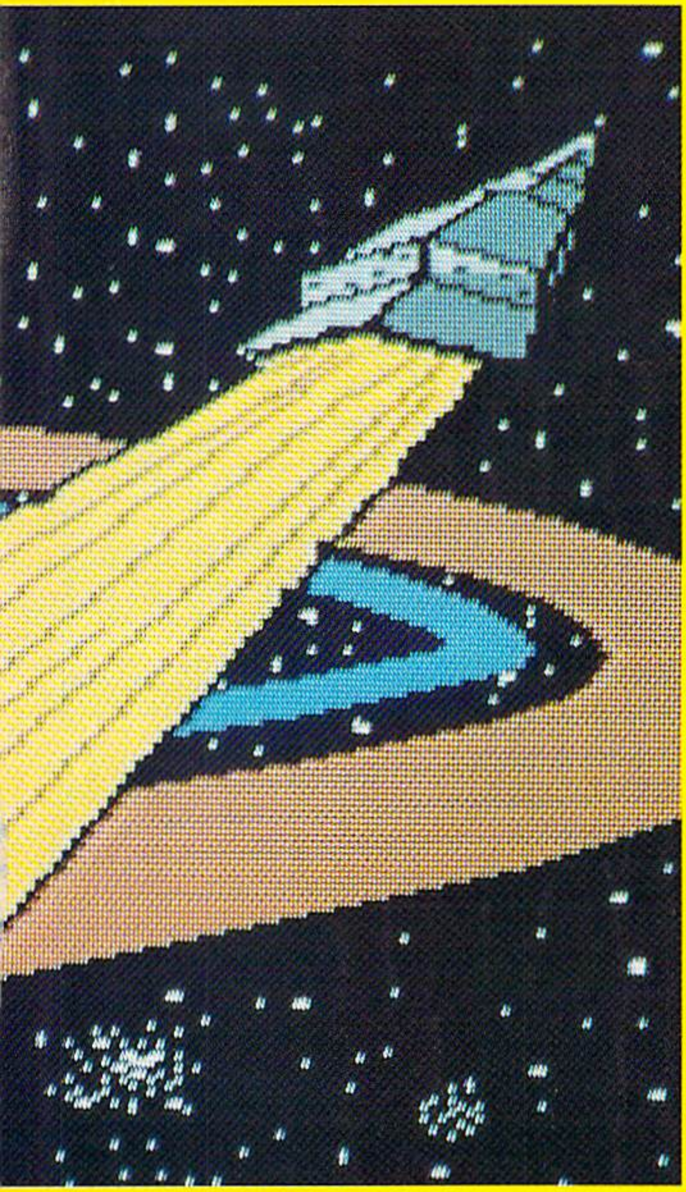
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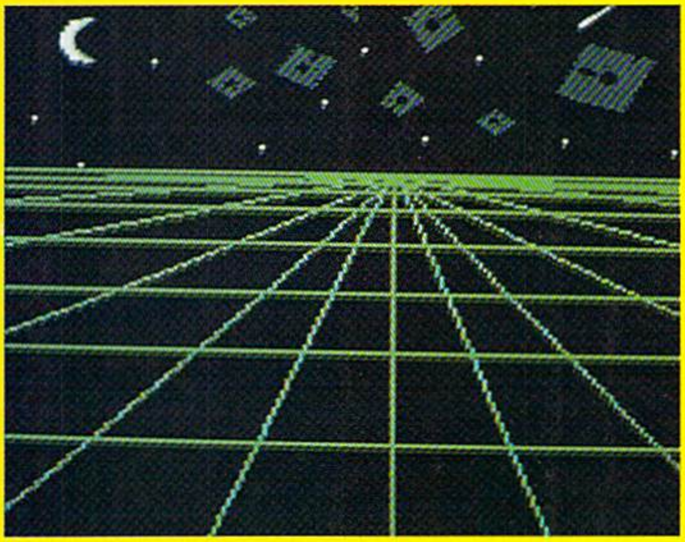


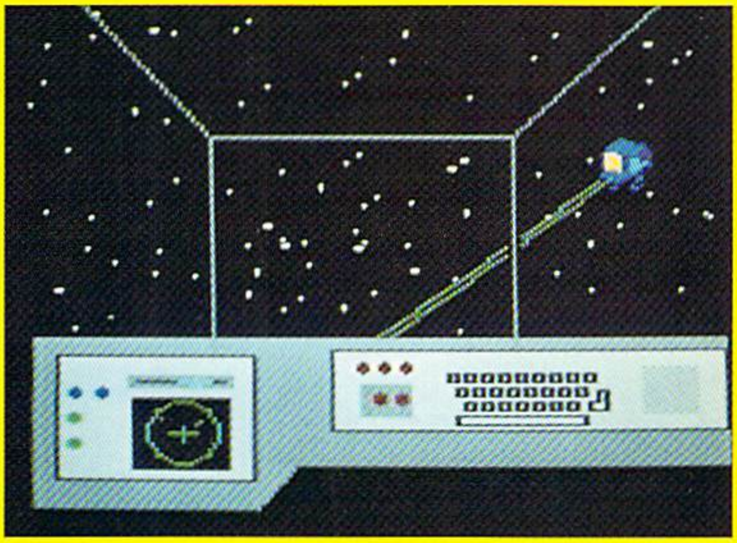




Though last month's all-Amiga *Art Gallery* was a tough act to follow, those diehard Commodore 64 illustrators have done everything humanly and computationally possible to show that the 64 remains a perfectly acceptable tool for graphics programmers. From the efforts reproduced here, we trust that the validity of their theory is obvious—as is the theme of this month's collection. The large image at left is *Journey* by Chris Doenges (New Haven, IN). To its right is *Tower* by Clifford Dye and daughter (Ocean Springs, MS). Continuing clockwise are *View of the New Frontier* by Bill S. Lange (Parma Hts., OH), *Invasion* by Tod Baldridge (Markleville, IN), *Space* by Wilfred Allen Sessoms (Bronx, NY), and the perfect symbol to mark this month's reaffirmation of the C-64: *Commodore Logo* by Sandra Steele (Rockford, IL). This is Sandra's third *Art Gallery* appearance, out of nearly 50 screens submitted. It was rendered on *Blazing Paddles*—this month's only non-*Koala* image.







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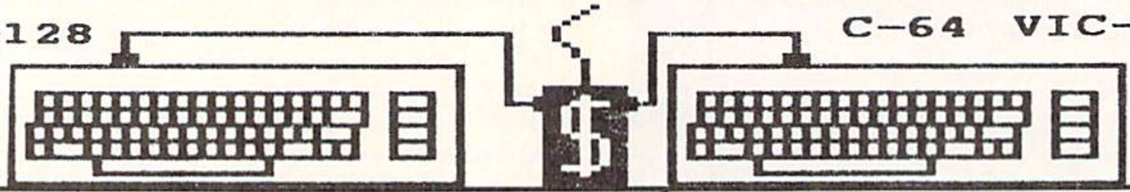
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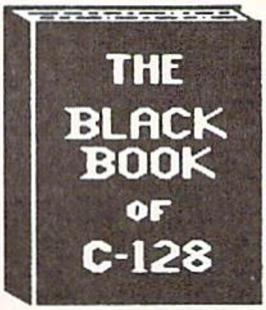
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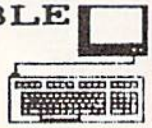


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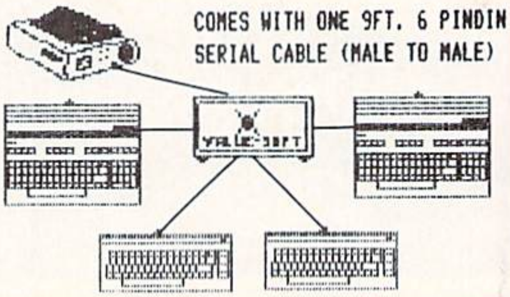
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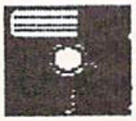
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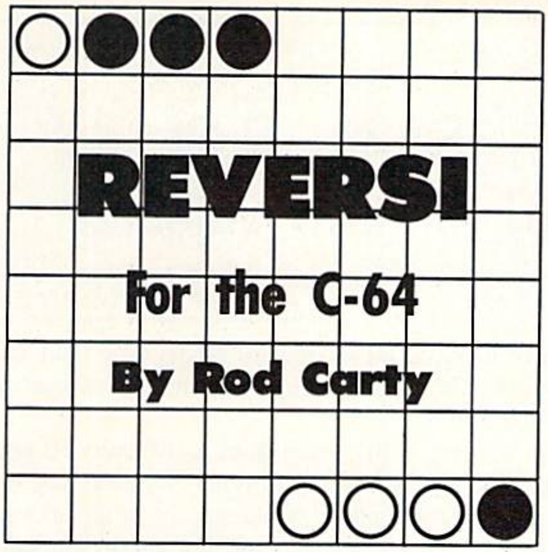


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REVERSI

For the C-64

By Rod Carty

This is a C-64 version of a popular board game, for two players. Scoring and rules are built into the program, so those who are new to the game can concentrate on strategy.

C-64 owners with only one joystick can use keyboard keys instead of joystick #1. The proper keys are explained in the instructions at the beginning of the game.

The board display was done with PET graphics—four characters per square or playing piece.

When the game is first set up, the white player's cursor is in the top left corner. Using a joystick in Port #2, this can be moved anywhere on the board. Placing a piece is accomplished by moving the cursor to the desired position and pressing the fire button. If this is a legal position, i.e., allowed by the rules of the game, the program puts a piece there. Then all "bracketed" pieces are changed in color and the score is updated. Now it is the green player's turn. Play continues either until all 64 board positions are filled or one player has no more pieces left.

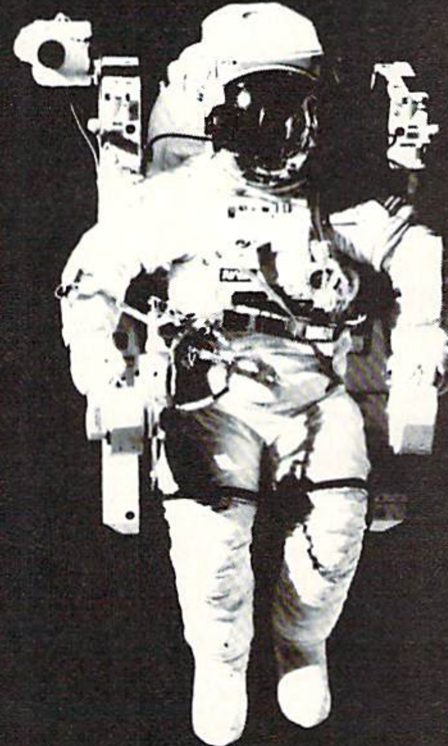
For a move to be legal, you must bracket at least one of your opponent's pieces in a straight line between an existing piece of your color and the one you put down. When your piece is played, all bracketed pieces, in up to (all) eight directions, will be changed to your color from your opponent's. Choices of play must be weighed for a) numerical advantage (greatest number of pieces changing to your color), and b) strategic or positional advantage. As in chess, planning moves ahead and anticipating your opponent's moves makes the game interesting. Unlike chess, the face of this game can change drastically from one move to the next—particularly further along in the game.

Regarding positional advantage—middle of the board positions are least important, edge pieces are more important, and corner pieces are the most important (they cannot be changed). Placing your piece one square from the edge or corner may cause your opponent to be able to place his piece on that edge or corner on his turn.

The program is laid out fairly linearly, so making your own modifications shouldn't be too hard. I also left many REMs in to help you find your way. ☐

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FLAP! for the C-64

By Andrew Vajoczki

You are among the last survivors of the elite *Flap* league. The strange effect of cosmic rays upon the planet Arion in centuries past has permanently altered the state of the populace. Many of your race have transformed into mindless, evil drones whose only intention is the elimination of the few remaining members of the *Flap* league.

As you may have guessed, you must not let this happen. It is your skill in flight that will enable you to destroy the enemy drones. *Flap* scientists have determined that the drones' vulnerability lies in the upper part of their bodies (their Achilles' Heel, so to speak). So to win in battle you must strike them from above. Unfortunately, you too can fall prey to this same weakness, and will lose a bird should this happen to you. To make matters worse, in order to sustain life on this inhospitable planet, it is necessary that you land on the flashing "targs" for essential energy. Upon every eight landings, you are awarded an extra 60 seconds of bonus time (and go up a level in difficulty). Should time run out, however, you will lose a life.

The scoring of the game goes as follows: 50 points for each enemy destroyed, 40 points for each targ landing, plus an additional 10 points to each of the above for every level you go up. 10 points are also rewarded for every second left over upon entering the next level.

You lead a squadron of four birds into battle. Flight is achieved by successive pressings of the joystick button while pointing the bird in either the left or right direction. (This is not as easy as it sounds, because you will be required to fight the force of gravity at the same time.)

Plug the joystick in Port 2. The "fl" key will reset the game.

Good luck! Long live the *Flap* league! □

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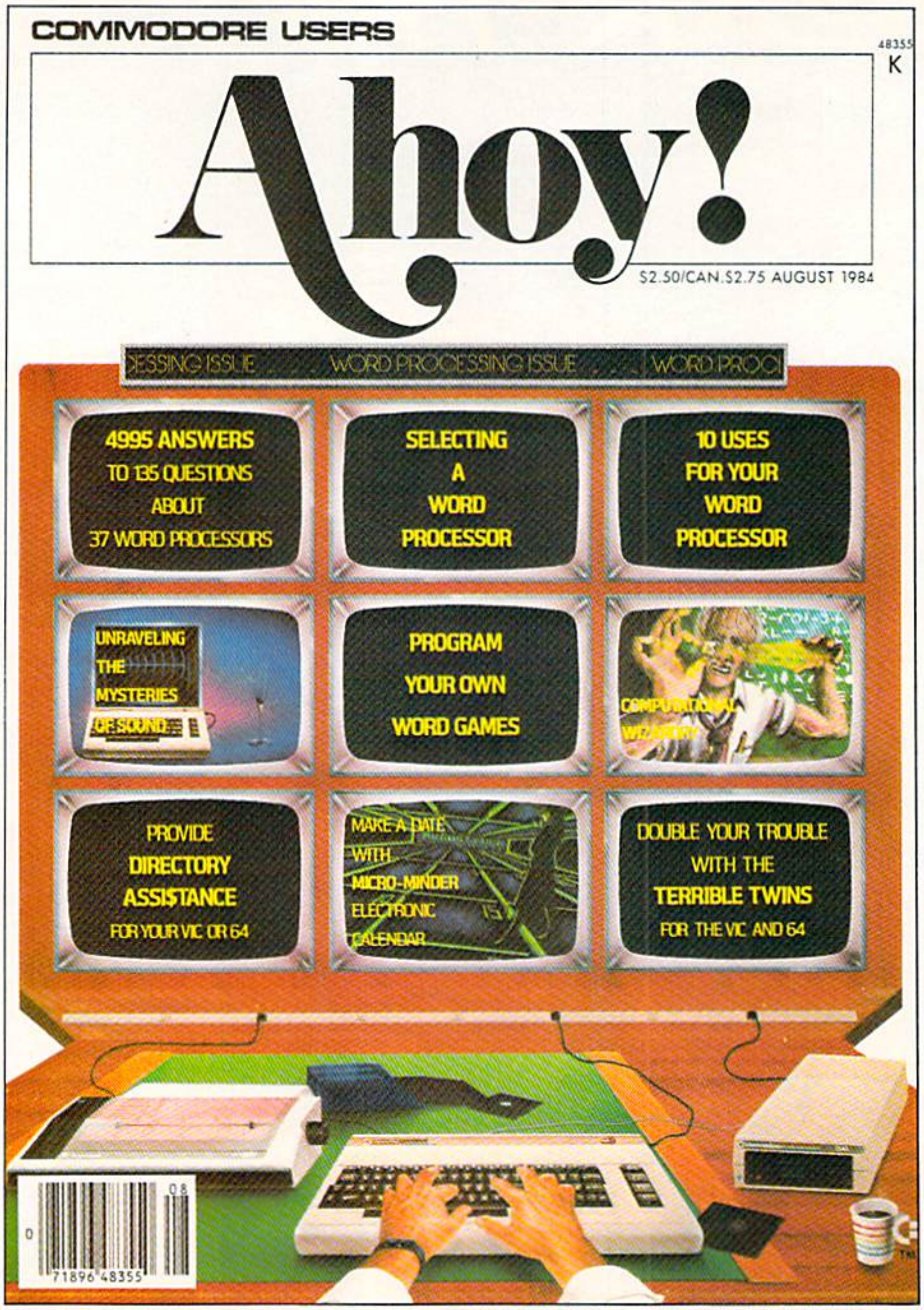
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STEP ON IT



For the C-64

By Penny DeGroff

You live in Tenalp, a country where the unemployment rate is a staggering 36%. Since losing your full-time job almost a year ago, and after your best friend joked that you needed a bigger table for your unpaid bills, you decide to visit the temporary employment agency.

While passing the Whappie Manufacturing Company, you see a sign in the window that reads "PERMANENT, FULL-TIME POSITION AVAILABLE...INQUIRE WITHIN."

Knowing this is the opportunity of a lifetime, you go inside where you are introduced to Mr. Wooder, director of personnel. He explains to you that the land on which Whappie Manufacturing was built was once a giant forest. The forest was inhabited with various animals, most of which accepted the inevitable and moved on to another forest a short distance away. However, one animal chose to stay. This rapidly multiplying creature, commonly called an Um, has taken up residence inside the building.

Mr. Wooder then escorts you to Level 1 of Whappie Manufacturing. "As you can see, this building has several levels," he says. "Each level has some platforms on the floor." Following Mr. Wooder's gesture, you see a baby Um on each platform. You also see the mother Um hopping from one platform to another. "We stack our merchandise on these platforms. But we can't while the baby Ums are here. Your job will be to dispose of them."

You tell Mr. Wooder that you will take the job, then go with him to the supply room. Here you meet Spabber, who hands you four boots and wishes you good luck. Seeing the bewildered look on your face, he tells you that the Tenalp government has banned the use of pesticides and that it is much too dangerous to shoot them while the other employees are working. The only way to destroy a baby Um is to step on it. YUK!

Here's how to play the game. Using a joystick in Port 2, move the boot diagonally from one platform to another. For each baby Um stepped on, you receive 25 tebos (the Tenalp monetary unit). You begin with four boots, but lose one each time you come in contact with the mother Um. Occasionally, when the mother Um hops to an empty platform, a baby Um will appear.

Whenever you step on all the baby Ums on one level without losing a boot, you receive a bonus boot. Up to nine boots may be in your possession. And you get bonus tebos (100 times the level number).

After losing all your boots, the final and high scores are displayed. Good luck. □

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Making War on the 64

A Primer for Armchair Generals

By Arnie Katz

From "Rambo" to "GI Joe" to wrestling's Corporal Kirshner, military mania is on the march all across America. With this upsurge of interest in war and warfare has come a heightened appreciation of wargames.

Militay simulations have always had a lot to offer. They provide a unique chance for people to study major historical events from the "inside" through vicarious participation.

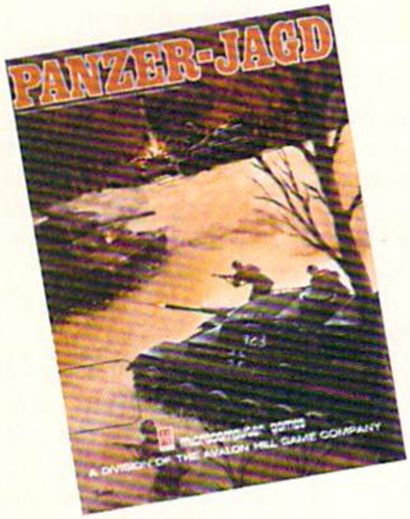
They also offer an unparalleled opportunity to exercise mental muscles. Complex situations test the player's ability to develop and implement equally sophisticated strategies.

Computer wargames are even better than the non-electronic type. Microprocessing eliminates laborious record-keeping, facilitates the use of limited intelligence rules and, in the case of many war programs, allows solitaire gamers to play, too.

Before the Battle

The problem with military simulations is that it's hard to get started. Those who have never played such games, or who have played them only a few times, frequently crash into a wall of frustration within five minutes of opening the package. Computer wargames are the antithesis of "boot and bash" action contests. The people who enjoy them most are the ones who learn how to play them well. That's the purpose of this article.

The variety of situations found in computer military simulations makes it impossible to formulate perfect plans for unstoppable attacks and impregnable defenses. Civil War-era tactics would be ridiculous if applied to a simulation of amphibious operations in the Pacific Theater of World War II.

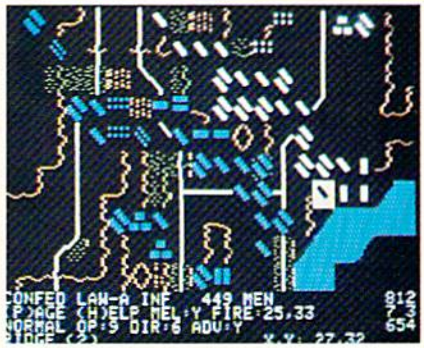


Panzer-Jagd *(Avalon Hill)*
READER SERVICE NO. 151

Therefore, the aim here is to furnish general guides which will help the computer commander approach an unfamiliar title with confidence. The subtleties of military simulations must be learned through actual play, not from magazine articles.

Choosing the right game in the first place is crucial. No one picks up a tennis racquet for the first time and faces John McEnroe. Similarly, a relative novice shouldn't begin with campaign-length maxi-games with zillions of rules for minutely replicating the original conflict on the computer monitor.

Fortunately, the publishers are painfully aware of the chilling effect an advanced military simulation has on a raw recruit. That's why outfits like The Avalon Hill Game Company and Strategic Simulations clearly label their games according to difficulty. Other manufacturers, such as MicroProse and Broderbund, offer complete lines of wargames which are geared to the tastes of those who don't want to drown in complexity for the sake of historical accuracy.



Battle of Antietam *(SSI)*
READER SERVICE NO. 152



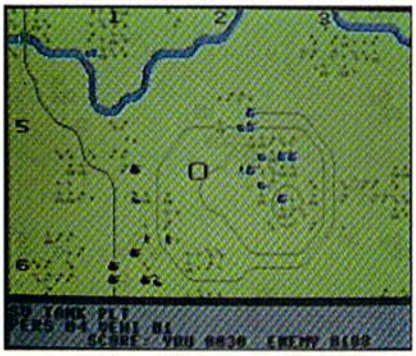
Kampfgruppe *(SSI)*
READER SERVICE NO. 153

Even in the absence of a specific difficulty declaration on the box, a gamer can usually spot an appropriate title. Look for games which are based on battles from World War II or earlier in which the typical size of the "playing piece" is a division or regiment.

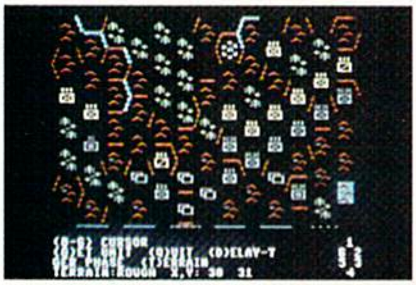
Rules for air warfare are invariably complicated, and the strategies for naval engagements can be mighty elusive to the uninitiated. Simulations which focus on small units (squads, platoons, and the like) generally incorporate detailed rules for terrain and weapons differentiation which can confuse newcomers, while strategic-level simulations (in which a



Panzer Grenadier *(SSI)*
READER SERVICE NO. 154



Battalion Commander *(SSI)*
READER SERVICE NO. 155



Breakthrough in the Ardennes *(SSI)*
READER SERVICE NO. 156

unit might represent a whole army) are often too sedate for all but hardcore armchair generals.

Boot Camp

The bad news, particularly for those who are used to action games, is that reading the instructions is indispensable. The documentation outlines play-procedures, defines scenarios, and, if you're lucky, provides historical background and hints.

A good procedure is to boot the game disk and play through the start-up procedure and a sample round of play with the book in hand. Some programs include interactive tutorials or streamlined "learning" scenarios. Don't be embarrassed to start at the program's most elementary level. There'll be plenty of time to move up to the meat-and-potatoes portion of the contest after you learn the basics.

And don't skip seemingly nonessential sections with titles like "Historical Background" and "Designer's Notes." Authors of combat software are frequently highly knowledgeable about, and strongly committed to, their subject. Their comments on the real battle and the simulation of it contain nuggets of pure gold information for the gamer. If, for example, the designer beats his chest with pride over the line-of-sight rules in the game, it's a safe bet that the side which acquires good intelligence of the enemy's activities will greatly enhance its victory chances.

Planning for War

Military simulations differ from most other types of computer game in one major respect. Whereas thinking on the fly is the prime requisite for action strategy, arcade, and sports contests, taking things one step at a time only spells trouble in wargames. Though no plan can allow for every contingency, the wise player studies before moving the first unit on the map.

Here are four questions to ask before playing a military simulation:

1. What is the objective? You need to know what your forces are supposed to accomplish, how many turns they have to do it, and what bonuses and penalties, if any, are available.

2. What is the other side trying to do? There's no need to study the opponent's objectives in detail, but reviewing them provides direction for structuring the defense.

3. What forces are involved? The different unit types and their individual capabilities should be learned. Failing to do so is like not knowing how to move the knight in chess.

4. Are there special considerations, like terrain or obstructed line-of-sight, which the documentation emphasizes? If present, such rules are invariably pivotal. Study the map to see how terrain and sight barriers might aid either or both sides in the battle.

Armed with this information, you're all set to strap on your helmet and charge into the fray.

THE TEN-MINUTE MILITARY ACADEMY

Those who've been to West Point or its equivalent can skip this section. For the rest of you, it suffices to say that time, study, and battle experience has led military philosophers to develop theories about how to conduct a war.

Experts differ over the details, and the particulars change from era to era. Yet certain approaches are as sound for combat involving Roman legions as for fights on World War II's Russian Front.

If you don't have time for a few years at a military academy, don't give up. Here are some rules for generals to live by:

- An attacker needs approximately 3 to 1 superiority over the defender to have reasonable assurance of victory in a skirmish. There is some chance to succeed with lower odds, of course, but a whole string of risky attacks can cripple a player's chances in a single turn.
- Since one side seldom has overall superiority, every strategy should aim to create a local superiority. That is, your goal is to orchestrate things so that you can get 3 to 1 odds when you make key attacks at specific points.
- Economy of forces must be

ALTERNATE REALITY (THE CITY)

Datasoft
Commodore 64
Disk; $39.95

As veteran computer adventurers know only too well, a good quest is hard to find. Especially rare are sophisticated role-play environments of the Dungeons & Dragons type. Such contests depend less on a preordained plot than on the development of characters, freewheeling exploration, and a sense of wide horizons and seemingly endless possibilities.

Believe it or not, a superior role-playing computer game was ready, but remained unpublished, for more than two years. Bad timing and a string of soap opera circumstances have conspired to keep the title off store shelves until now.

maintained when allocating units to various tasks. Don't use more units than necessary in any offensive or defensive operation, because that increases the likelihood that your opponent will pull off the three-to-one trick where you have thinned out the ranks too much.

• Frontal attacks are the least effective. In war as in lovemaking, a little subtlety goes a long way. Assaults from two directions are always more deadly. In military simulations on the tactical level (platoons, squads, and brigades), attacks from the flanks or the rear can be devastating, even against units which look unbeatable head-on.

• Maintain your lines of supply and retreat while cutting those of the enemy. Not every game has supply rules, but cutting an army off from its "tail" is an easy road to victory in those which do. Hemming in an enemy is likely to inflict extra casualties and eliminate the need to fight the same group of foes again and again.

• These tips won't turn you into Clausewitz overnight. Those who are willing to put in some effort, however, can approach the challenging field of military simulations with confidence and learn why thousands of gamers keep a Field Marshall's baton next to their computers.

Alternate Reality (The City) by Phillip Price (programming), Craig Skinner (art), and Gary Gilbertson (music) may have kicked around for a while, but it doesn't show its age. It's still state-of-the-art adventuring for Commodore home computers which offers users the depth and texture of a first-rate role-playing adventure with full sound and graphics.

As the game begins, a mysterious spaceship has snatched the player from earth. The player awakens in a room with a single exit. Beyond this portal lies the city of Xebec's Demise. Across the top of the exit is what looks like a seven-windowed slot machine. These numbers represent the player's attributes. When the wheels stop spinning, it sets values for each of the hero's attributes. An eighth window near the floor registers the number of copper coins the player can take with him into the city.

Xebec's Demise is a weird blend of science fiction and fantasy. There are encounters with aliens, shops with everything from soup to swords, inns full of fascinating characters, underground mazes filled with monsters, guilds, banks, healers, and force fields.

The computerist can move the hero around Xebec's Demise with relative freedom, ever mindful of what constitutes appropriate behavior in this bizarre metropolis. Questers quickly learn to be straightforward, to take strange tales with a grain of sodium, and to stay off the streets at night!

Characters are moved by joystick, with single-stroke commands used for interaction. A menu of available options appears onscreen whenever the user must make a more complex choice.

The program constantly updates the attributes, which appear in a horizontal band across the top of the playfield. Beneath that are listed experience points, level, and hit points. The graphic display is in the middle of the screen.

When the player moves through the city, it is viewed in full-color, three-dimensional perspective. Once the protagonist enters a building or establishment, the display widens from a square to a full horizontal window. The documentation is well-written and informative. It even includes a grid-map of the city.

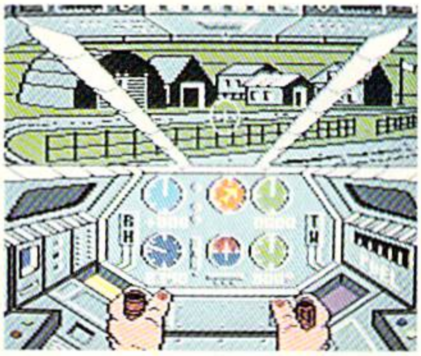
The City is only the first chapter in a saga that is expected to include at least four more installments. For that reason, there are certain locations which are off-limits at this level. These places will be accessed in future *Alternate Reality* scenarios.

The game's major weakness is a technological one: it requires an incredible amount of disk-swapping. Most adventurers, however, will flip those disks with smiles on their faces, delighted to have a game as rich and rewarding as *Alternate Reality (The City)*.

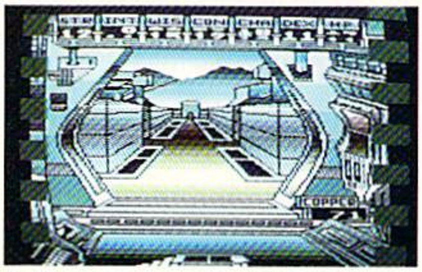
Datasoft, IntelliCreations, Inc., 19808 Nordhoff Pl., Chatsworth, CA 91311 (phone: 818-886-5922).

—Bill Kunkel





Role-play in an **Alternate Reality.**
READER SERVICE NO. 157



Infiltrator: *a panoramic experience.*
READER SERVICE NO. 160

INFILTRATOR
Mindscape
Commodore 64
Disk; $29.95

Look out, Mad Leader, here comes Captain Johnny "Jimbo-Baby" McGibbits! The documentation describes the protagonist of Chris Gray's incredible action-strategy masterpiece as "ace helicopter pilot, ballistics expert, neurosurgeon, rock star, motorcycle racer, and a devil-may-care all-around good guy with a nifty haircut."

The computerist will have to make

McGibbits, known to friends and foe alike as the Infiltrator, live up to this gaudy reputation. It takes a square-jawed hero to fly the Gizmo DHX-1 Attack Chopper through hostile territory and then continue on foot to complete one of three progressively more difficult challenges.

Infiltrator combines elements of the flight simulator with an action adventure format to create a panoramic gaming experience. This is an involving, cinematic game somewhat in the mold of 1985's *Karateka* (Broderbund) and *The Dam Busters* (Accolade).

The disk's opening sequence thrusts the computerist into the slightly askew world of daredevil pilot and renaissance maniac Johnny McGibbits. First, a screen-filling notebook displays a one-sentence synopsis of the next mission, followed by an aerial view of the home base field with a tiny drawing of an Infiltrator standing by its side.

The game itself begins with the well-drawn cockpit screen. The hands which grip the steering wheel actually move in response to commands entered with the joystick. So when the player hits the action button, the electronic surrogate makes a similar movement.

One-keystroke commands switch to the two other important screens in the flying phase of *Infiltrator,* the Computer and Communications. Another single-key order implements the "Heads-up Display" which places a sighting cursor on the helicopter's windshield.

The Computer Screen leads with two vital sub-displays, Status and Tactical Map. The former monitors damage, while the latter shows the chopper's position relative to its destination.

The Communication screen also has two primary functions. The computerist must acquire the ADF (Automatic Direction Finder) code from the Tactical Map and input the three-digit number in the appropriate location on the computer screen. This causes the directional arrow on the cockpit screen to point in the direction of the objective at all times.

The Communication screen allows the aircraft to send and receive messages. This is important when trying to distinguish friendly planes from enemies. All look the same, but the code name a plane sends in response to a request for identification gives a clue about its loyalties. For instance, an approaching plane which gives a codename ID like "Scum" is likely to be an enemy.

Once McGibbit's eggbeater reaches the Mad Leader's installation, the view switches to a three-quarter perspective view of the intrepid hero on foot. The gamer controls the Infiltrator with the joystick. The space bar toggles to a menu screen, where the user can activate items like papers, gas grenades, sleeping gas, the camera, and the mine detector.

Successfully completing even the easiest of the disk's three missions is a major accomplishment. The helicopter flight simulation alone would be a stiff challenge. Few gamers are likely to wear out *Infiltrator* in fewer than several dozen thrill-packed play sessions.

The documentation is long on charm, but short on information. There's too much emphasis on the colorful background of McGibbit and friends, and not enough concise data about playing *Infiltrator.* A two-sided reference card provides some help, but only a little.

Infiltrator is certainly one of this year's outstanding C-64 entertainment software titles. It's colorful, exciting, and mind-stretching.

Mindscape, 3444 Dundee Road, Northbrook, IL 60062 (phone: 312-480-7667). *—Arnie Katz*



"Tilt" mechanism for computer games disables sprite collision detection.
READER SERVICE NO. 158

THE INFINITY MACHINE
Mastertronic
Commodore 64
Cartridge; $24.99

Zap! Your little onscreen surrogate takes a laserblast and disappears in a multicolored ball of fire.

You shake your head sadly. Disappointment bows your shoulders. Maybe you'll never get past that pesky strongpoint. The vast gaming territory beyond the laser remains a total mystery.

Sound familiar? In action and action strategy games, the rewards go to those with quick minds and even nimbler fingers. Only players who conquer all the obstacles get the chance to see everything such an entertainment program has to offer.

Sad to say, most of us do not possess the quicksilver reflexes which smash through games to their glorious finales. The well-documented decline in physical prowess which comes with the onset of adulthood frequently leaves mature computer gamers fulminating with frustration after repeated, vain attempts to meet a game's physical challenge.

Rejoice fellow slow-hands! Mastertronic, a British company best-known for its line of low-priced entertainment software, has developed a special cartridge which can banish computer game performance anxiety.

The Infinity Machine doesn't speed up synapses to make it easier to leap over a game's hurdles, it eliminates the barriers completely. When plugged into the cartridge slot of a Commodore 64 or 128, it disables the part of the program which implements sprite collision detection.

Excising sprite collisions means that beams, bullets, and other hero-killers are totally defused. The computerist can now guide the onscreen character through previously impenetrable walls, laugh in the muzzles of enemy weapons, and generally run amok without fear of game-ending death.

The method of operation couldn't be simpler. Plug in the cartridge and turn on the computer. When the animated title page appears and the jaunty theme plays, *The Infinity Machine* is ready for action.

When the computerist subsequent-

ly boots an entertainment disk in the usual fashion, the cartridge remains quiescent until activated. It affects the game only when the player pushes the little button on the cartridge.

The Infinity Machine can be used three different ways. Method #1 disables every sprite on the screen so that nothing can kill your character. The second alternative disables only sprite-to-sprite collisions, which shields the character from enemy weapons and other lethal moving objects. The third choice cripples only the sprites in the background, such as those used to create walls, gates, and other barriers. The tiny four-page instruction folder suggests that the user should try each option to determine which yields the best results in conjunction with a particular title.

The cartridge has something for everyone. Even those rare computerists who, through clean living and genetic inheritance, can catch a falling glass of water without spilling a drop will benefit.

One of the frustrations associated with multilevel action games is that many require the player to start from the very beginning every single time. There's nothing more boring than grinding through a dozen previously completed playfields to get to the one which stopped progress in the previous round. By disabling the sprites, the user can cruise through the preliminary playfields without wasting time.

The truly awesome joystick jockeys will, of course, sneer at a crutch like *The Infinity Machine.* We mere mortals, however, will happily push the cartridge's button and learn, at long last, what thrills wait beyond that damnable laser.

Mastertronic, 7311-B Grove Road, Frederick, MD 21701 (phone: 301-695-8877). *—Arnie Katz*

SUPER BOULDER DASH
Electronic Arts
Commodore 64
Disk; $22.95

Rockford is the name of the little critter who digs for diamonds in *Boulder Dash.* A lot of computer gamers evidently dug Rockford, because Chris Grey's concept won a slew of awards for original publisher First Star Software. It became a hit in the United States, and it grew into a cultish obsession overseas.

What most Americans didn't know was that *Boulder Dash* spawned a sequel. That's because an unfortunate run of circumstances limited the follow-up's distribution to the United Kingdom and Europe. Designer/programmer Peter Liepa has created a worthy successor to the first Rockford disk with 16 fascinating new levels, each playable at five different levels of difficulty.

Now, for the first time, stateside players can test their ability to strategize on the fly against *Boulder Dash II.* Electronic Arts has done computer gaming a significant service by putting both *Boulder Dash* programs into a single package. The result is one of 1986's best computer entertainment values.

The computerist employs the joystick to steer Rockford along the tunnels of a boulder-strewn diamond mine. The bold burrower can even dig his own pathways to the sparklers.

While the rocks are sometimes useful battering rams for opening up otherwise-inaccessible sections of the mine, they are more often obstacles.

Rockford can push a single boulder horizontally or start an avalanche by removing a key supporting boulder from a pile. While the charmingly animated onscreen hero can stand directly under a boulder, the weight of a falling one eliminates one of the three Rockfords with which the gamer starts play. (Scoring 500 points earns an extra Rockford.)

The object is to collect the required number of diamonds on a level before time runs out. A summary line located at the top of the colorful playscreen shows the number of diamonds which Rockford must collect before the level exit door appears, the point value of each diamond, the actual number of gems accumulated, and the time remaining.

If Rockford beats the clock with time to spare, he can earn bonus points. Each diamond over the minimum also raises the per-gem point value. So while fast play is not an absolute requirement for *Boulder Dash* success, it substantially boosts the score.

Trial-and-error is the only way to learn the physics of the falling rocks. The instruction manual offers a few guidelines for novices, but watching the demos and playing the game at the easiest two skill settings is the quickest and best way to get into the program.

Boulders aren't the only menace which Rockford must overcome. Fireflies explode on contact with Rockford, but they move so predictably that they can be classified as only a minor annoyance. Butterflies are deadlier, since they fly in a less predictable pattern. They, too, explode on contact with Rockford, but they turn into diamonds after the blast.

The amoeba grows through tunnels and solid rock. If Rockford completely surrounds it with stone, it dies and turns into boulders. But if it grows too large, it becomes more boulders instead.

Other play-features include enchanted and titanium walls. The for-

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mer vibrate for a short time when struck by a falling boulder. While in this state, all boulders which fall through the wall metamorphose into diamonds. Titanium walls function as playfield boundaries. The exit doors appear in such walls after the player has scooped up the proper number of gems.

Super Boulder Dash has excellent graphics as well as such charming touches as playable intermissions, but the strategic situation is the main attraction. The game is classic in its simplicity, yet the large number and variety of playfields keeps it fresh for many, many enjoyable sessions.

Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404 (phone: 415-571-7171). *–Arnie Katz*

GULF STRIKE
Avalon Hill
Commodore 64
Disk; $30.00

Some military simulations are landlocked, limited to only ground units. Others are strictly nautical maneuvers, spiced up with a few planes. And then there are the air battles, in which planes go on bombing raids and fight each other in the air.

But to get a feel for the scope and complexity of real war, a military simulation must incorporate all three. *Gulf Strike* covers all aspects of land, sea, and air combat in the Persian Gulf.

Although this "what if?" title has no historical line to follow, it isn't a hard scenario to imagine. The USSR has invoked a 1921 treaty to attack Iran and put an end to that country's interference in Afghanistan. Certainly because of the oil riches there, and because of the openly hostile economic, political, and military differences, such a confrontation can hardly be labeled sheer fantasy.

Gulf Strike certainly doesn't feel like fiction. It is so solid and realistic, it is sometimes hard to remember that this campaign has never taken place.

The game can be played either solitaire against the computer or against a human foe. It takes 1 to 5 hours to play, depending on whether the foes are both slow humans, or one is a quick-thinking computer. It is possible to select the level of the computer foe so the competition can improve as you do. There are three ways the game can end: when 25 turns have been completed, when both players choose to end the game, or when the Soviet/Iraqi side captures nine Victory Point Squares.

The VPS's are the key to winning or losing. The US/Iranian forces start with control of all 21, and must defend as many as possible through the 25 turns. When one of the three conditions for ending the game is met, the computer gauges the degree of victory for either side.

It would indeed be surprising if *Gulf Strike* were not believable. Avalon Hill has been making accurate non-electronic wargames longer than anyone. *Gulf Strike* upholds the company tradition in the computer age.

Gulf Strike isn't as visually appealing as some other simulations. The graphics get the job done in pedestrian, but adequate, fashion.

What *Gulf Strike* lacks in outstanding visuals, it makes up for by artfully arranging a wealth of text information on the screen. Across the bottom is a status message window that tells the nationality, unit size, type, movement points, hit points, and values of any unit. The top two thirds of the screen is the map playfield.

Since units can be stacked on the same area, a bar next to the terrain indicator lists the general types of units in that stack. A commander then uses the joystick to retrieve information about any of the units.

Each turn, which represents two days, is divided into thirds. The first is the ground, naval movement phase. Second is air movement and combat. Third is ground and naval combat.

The method of combat resolution is a particular strength of *Gulf Strike*. Many current games resolve battles with such quickness that the gamer ends up groping for results. The program can handle the combat that way if desired, but there's another option. Play can stop after each battle to provide an opportunity to absorb and possibly agonize over the outcome. Pressing the fire button on the joystick displays the next combat result.

Another nice feature is the ability to put ground units into formations. There are six (move to contact, hasty assault, deliberate assault, travel, hasty defense, and deliberate defense) from which to choose.

A session-in-progress can be saved at the end of any turn. It's a good idea to have an initialized disk handy for this purpose.

Because much of the information is carried in abbreviations, you'll probably have a dog-eared instruction manual before too many playings. Fortunately, the documentation is complete and easy to follow on first reading. It is also arranged logically to make much of its information easy to locate.

Mark Herman did the original board game design for Victory Games, and much of *Gulf Strike's* feel is that of a board game brought to the computer. Winchell Chung designed the computer version on Atari first and Dyadic Software did the conver-

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sion for the Commodore. Everyone associated with the production of this superb simulation is entitled to take a bow.

Avalon Hill, 4517 Harford Rd., Baltimore, MD 21214 (phone: 301-254-9200). *—Rick Teverbaugh*

U.S.A.A.F.

Strategic Simulations, Inc.
Commodore 64
Disk; $59.95

One of the most remarkable operations of World War II was the daylight bombing of the Third Reich in the 1943-1945 period. *U.S.A.A.F.* (which stands for United States Army Air Force) allows computerists to command either side, or even watch the program play itself, in this classic clash.

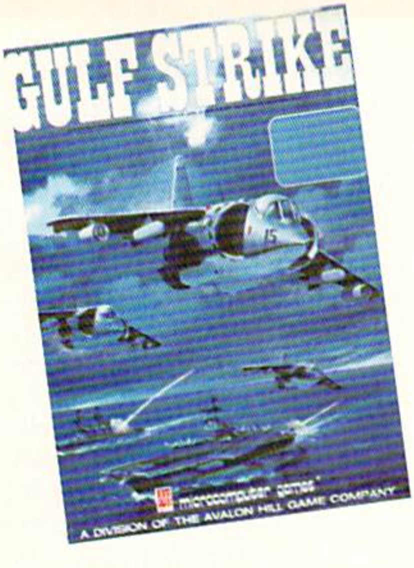
The important word here is "command." This is no contest of begoggled fighter pilots dueling like modern day knights. In *U.S.A.A.F.*, the Allied commander is largely concerned with maintaining the air armada and assigning targets for raids, while the Luftwaffe chief attempts to mount a strong defense.

The need for quick reaction to surprises, especially on the part of the German player, gives *U.S.A.A.F.* an immediacy and excitement which will greatly surprise some, but don't expect to sit on the edge of your chair throughout the game. *U.S.A.A.F.* promises fun-filled hours for devoted wargamers, but its wealth of detail and stress on logistics make it far too esoteric for the "beer and pretzels" weekend wargamers.

Gary Grigsby, a Hall of Fame computer wargame designer if there ever was one, has done everything possible to make *U.S.A.A.F.* both as exciting and as simple to use as possible.

The white, blue, and black maps of Europe are graphically bold, and their informal design lightens the "feel" of the program perceptibly. Its deliberate imprecision maintains what real-time excitement the simulation has while communicating the ambience of a situation map back at headquarters.

The game moves from phase to phase in response to screen prompts. Keystrokes toggle among choices



Gulf Strike: ***the new Persian Wars.***
READER SERVICE NO. 159



U.S.A.A.F.: ***stress on logistics.***
READER SERVICE NO. 161

which are, whenever possible, arrayed in menus to speed the pace of play.

U.S.A.A.F. includes three scenarios. Phase I begins in August, 1943, when the U.S.A.A.F. has finally gotten enough aircraft to make deep penetration raids practical. Phase II, February, 1944, marks the start of the period during which the U.S.A.A.F., for the first time, had the planes to escort bombers to and from their targets instead of leaving them unprotected against Nazi fighter patrols.

Phase III, which commences on October, 1944, depicts the final stages of the air war against Germany. A depleted Luftwaffe, buttressed by a small supply of highly advanced aircraft like the jet-propelled ME262A, attempts to hold out against the rising aerial might of the advancing Allies. Each of these scenarios can be played as a campaign with an unlimited number of turns or as short games which correspond to a month of battle.

The instruction booklet covers the rules with the thoroughness one expects from SSI, but more historical notes would have improved the package. An informative section provides silhouettes of all planes used in the scenarios along with summaries of their basic capabilities. Two durable map cards make things easier during head-to-head competition.

U.S.A.A.F. won't send the needle on the excitement scale through the roof, but it is an absorbing contest for experienced military simulation gamers.

Strategic Simulations, Inc., 883 Steirlin Road, Building A-200, Mountain View, CA 94043-1983 (phone: 415-964-1200). *—Arnie Katz*

BRIAN BLOODAXE/REVELATION/ QUO VADIS

Mindscape
Commodore 64
Disk; $14.95

Americans can take a peek at what their British cousins are playing by trying this combo package of three best-selling games from the United Kingdom. A special licensing agreement permits Mindscape to present three UK titles at a bargain price.

The English computer gamer is a different breed from the American counterpart. They are tougher, with



Three Mindscape games on one disk.
READER SERVICE NO. 162

more stamina and lots more patience than we have, if these three titles are indicators. Most American gamers won't spend the hours necessary to conquer one of these British dreadnoughts. It's not just that the games are fairly rigorous tests of hand-eye coordination. There's no way to mas-

ter them except through repeated failures and onscreen deaths.

Part of the problem lies with the documentation. English computer gamers don't like instructions. They consider the learning process to be part of the total gaming experience, and feel cheated if the rules reveal too much about the contest. Don't look for many details about play strategies in the booklet that comes with this disk!

Brian Bloodaxe jumps and climbs his way through 104 screens of obstacles, puzzles, and disasters. The little warrior must negotiate a complex array of threats while he gathers useful tools, weapons, and treasures. The ultimate goal is to locate and capture the Crown Jewels, and take them to the Throne.

Before this lofty goal can be reached, the hero must get past a seemingly endless collection of foes. Passages and chambers are stuffed with varied adversaries, and each requires the gamer to discover new strategies to avoid death.

Most of the villains are well-drawn, and stamped with the same sense of humor which has become a hallmark of English games. They include, among others, rampaging bulls, crashing gates, sea monsters, stomping shoes, Dalleks, miners and coal carts, falling swords, ducks, covered wagons, and, of course, hostile warriors.

Using keyboard and/or joystick control, the gamer moves Brian through the land, leaping and jumping from point to point. Although each screen-filling chamber is not terribly difficult (almost any gamer should be able to manage most of the challenges), Brian has to die over and over until each puzzle is solved through trial and error.

Revelation is a flying and shooting program reminiscent of some of the great videogames of yesteryear. Mounted on the back of an eagle, the hero seeks out and destroys five towers on each level. The citadels are guarded by hosts of flying monsters. Shooting these evil protectors avails the gamer little; they regenerate almost instantly, as long as the towers they protect still stand. When derring-do levels all five towers in each cavern, the flying hordes can be dispatched for good. When the creatures are all dead, the champion automatically advances to the next cavern.

At the easiest levels, it's not hard to knock monsters out of the skies, since they are fairly large targets. As the game progresses, though, the villains get smaller, faster, and harder to hit. And there are a whole lot more of them!

The 31 different creatures are well-cartooned and colorful, so they produce a screenful of attractive targets. The attackers include bees, flying serpents, and other horrors drawn from mythology.

The protagonist is armed with a lance that fires continuous bolts of energy. Two skill settings add an extra dimension of play. At the simplest setting, the gamer's only task is to maneuver the mount around the screen with the joystick. The more difficult challenge requires the computerist to press the fire button to stay airborne.

Revelation contains nothing new or innovative. The videogame-style graphics are pleasant, though, and this will please everyone who still enjoys nonstop action. There are 40 separate caves, each with its own airborne defenses. As the gamer advances to deeper caverns, the combat becomes more and more intense because of the increased number of flying foes.

The gamer earns another life for each cave cleared, up to a maximum of six. You'll need every one of the extras to destroy these Hordes of Hell.

Quo Vadis, the last in this triplex of Anglo-hits, is possibly the best of the three contests. Armed with a magic sword which shoots magic bolts, the adventurer descends into a cavern dominated by the Dark Lord. There, in a hellhole of demons and lava pits, the hero must destroy evil, while seeking clues which lead to the Sceptre of Hope. Only this mystic artifact can bring about the downfall of the Ancient Terror.

It's a familiar enough scenario. Leaping and jumping over obstacles and pitfalls, the hero seeks treasures, fights a variety of villains, and tries to solve the conundrums that riddle the rooms. But on the other hand, *Quo Vadis* is a very difficult game which should hold the attention of even accomplished joystick jockeys for a long time.

The attractively drawn onscreen hero carries a shield that grants some protection. The constant onslaught of villains quickly wears out the shield, so it takes a tough gamer to hold off the enemies and save the world.

A valuable extra feature should keep *Quo Vadis* alive for many hours of additional fun, even if the gamer should eventually conquer its hundreds upon hundreds of chambers. *The Quo Vadis Generator* randomizes the domain and creates a different arrangement of rooms filled with perils, riddles, and traps for each run. The Generator produces a newly randomized kingdom for each play session, so the computerist can always look forward to new excitement.

Quo Vadis is the subject of a contest sponsored by The Edge, the original British publisher of the title. The first person who answers all the riddles in the game wins a $10,000 sceptre. All the details are in the instruction booklet which accompanies the disk.

Quo Vadis was a megahit in England. Americans who enjoy this type of adventurous search-and-destroy mission can anticipate hours of bloody mayhem. Although this contest differs little from other descendents of *Mission Impossible*, it does boast cleverly animated villains, many of which are the same as those seen in *Revelation*.

The joystick-controlled action is smooth and responsive. The riddles keep *Quo Vadis* from being just another shooting game by offering a mental challenge to complement the physical one.

British games, this package included, are not quite up to American state of the art. The graphics aren't equal to the best created in the US, and the programs echo themes of popular games of the past. But this sampler is still an outstanding entertainment bargain.

Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062 (phone: 312-480-7667). *—Joyce Worley*



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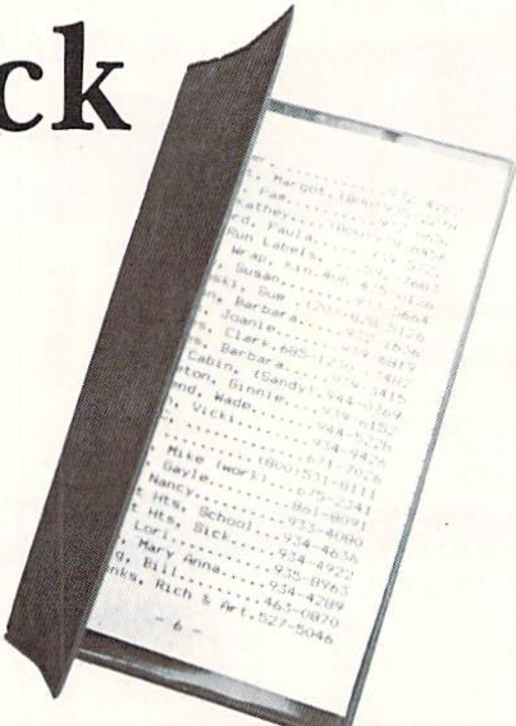
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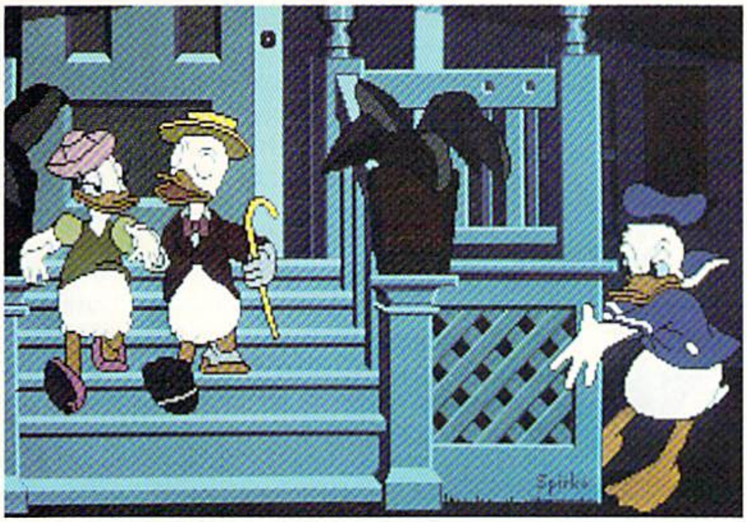
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HEART and SOUL of the AMIGA 1000

A HARD LOOK at the SOFT SIDE of AmigaDOS and AmigaBASIC on the MACHINE WHICH WILL ENRAPTURE the MIND

Text and Photos by Morton Kevelson

The key to the Amiga's capabilities is its advanced hardware design, in particular the technology imbedded in its custom chips. The outward manifestation of this technology is the Amiga's user-friendly interface as embodied in its operating system. Dubbed *Intuition,* this prime user interface combines the simplicity of graphic interaction with the power and precision of a conventional text-based command stream.



Owning an Amiga can make your friends as jealous as Donald appears in this low resolution, 32-color image by Bob Spirko.

The user's initial confrontation with the operating system is the *Workbench*, an icon-based, mouse-driven interface where the fingers never contact the keyboard. In fact we found it feasible to operate the Amiga, via *Workbench*, with the keyboard completely disconnected from the Central Processing Unit (CPU). In this regard we imply the execution of meaningful tasks and not just the mindless manipulation of onscreen icons. Virtually all of the system's operating parameters, such as printer selection and setup, as well as disk maintenance and file manipulation, can be performed via the *Workbench* and the mouse without resorting to the keyboard.

The most impressive part of this performance is the speed at which the icon manipulations take place. The user rapidly loses any awareness of the enormous computational requirements behind this graphic extravaganza. All *Workbench* operations are performed by properly positioning the onscreen pointer and depressing or clicking one of the two mouse buttons. In general the left button performs an operation while the right button activates the onscreen menus.

Simply holding down the right button and dragging the pointer across the screen's top bar displays a series of menu headings. Dragging down the pointer highlights the individual commands. Selection is easily implemented by highlighting your choice and releasing the button. Although *Workbench* has managed to eliminate the need for a keyboard, it has not negated the need for the fundamental reading skills.

Workbench effectively implements the single-handed, single-fingered control of the Amiga. In so doing the need for a new eye-to-hand coordination skill is created. A painless introduction to the *Workbench* is provided by the *Amiga Tutor* which may be found on the Amiga Extras disk included with the system. This program by Mindscape literally takes the user, with mouse in hand, through the *Workbench's* paces. The tutorial's graphics are stunning, making a quick run-through a worthwhile activity for even experienced mouseketeers.

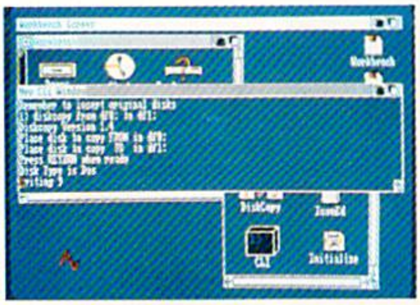
WORKBENCH OPERATIONS

When a disk is slipped into an Amiga drive, the computer automatically senses its presence. *Workbench* immediately examines the disk and displays its pictorial representation (an icon) and its name on the screen. If the mouse is clicked on the disk icon, a window immediately appears on the screen which may contain

additional icons representing the various files and applications on the disk. These icons may now be mouse-clicked to start an application, or to open additional windows which may contain additional icons, *ad infinitum.* The number of simultaneously open windows and running applications is limited only by the Amiga's memory.



Multitasking: Zork *in top window,* Analyze *in bottom window, 40K to spare.*



Workbench *screen overlaid with a CLI. A DiskCopy is about to be executed.*



Workbench *with CLI. LIST command has just been used to display directory.*

The appearance and feel of an active *Workbench* screen is not unlike a busy desktop. Windows, which correspond to papers, pads, and file folders, can be conveniently reordered and shuffled about. The big difference is that the edges of these papers will never become wrinkled, torn, or frayed. While it is still possible to generate a healthy amount of clutter, the likelihood of ever losing a page is minimal.

Each window is equipped with a collection of standard "gadgets." The upper left hand corner gadget closes a window, removing it from the screen. The top bar is a drag gadget for repositioning of the window. The lower right hand corner is a sizing gadget for enlarging and shrinking the window. The left bar is a disk gauge representing space remaining (for optomists) or space used (for pessimists) on the disk. The right and bottom bars indicate the presence and position of additional material which may be hidden beyond the edges of the window. These bars also let you position the contents of the window with respect to its visible part. The top bar of the *Workbench* screen maintains a display of remaining available memory. This top bar also serves as the source of the various pull-down menus used by the *Workbench* and the application software.

Operation of the *Workbench* and its gadgets becomes intuitive in a surprisingly brief time. The ease of the transition into the *Workbench* environment is greatly facilitated by the speed of its operation. Most notable is the rapidity with which screen updates are performed.

WORKBENCH UTILITIES

Included with *Workbench* are several useful utilities or mini-application programs. The most popular is likely to be the *Notepad,* a mini-text editor which allows the user to leave messages on the disk and printer. Use of the Amiga's keyboard will be required. *Notepad* includes access to several text fonts and styles which are included on the *Workbench* disk. Saving a *Notepad* message automatically creates a corresponding icon on the disk. Opening this icon automatically boots the *Notepad* program, saving the user several steps.

A four-function calculator is another *Workbench* tool. The Amiga's keyboard is not needed, as all the calculator buttons can be "pushed" with the mouse. A *Clock* tool may be selected to put an analog or digital display on the screen. The time and date are set using the *Preferences* tool.

Preferences may be the most significant program included with the *Workbench.* It is used to customize the Amiga as per your personal tastes and specific hardware configuration. All the Amiga's basic operating parameters are set with *Preferences.* These include the screen colors, mouse speeds, screen centering, text size, and clock time. Hardware specifics for the printer and modem are made from the *Preferences* screens.

Two printer screens are included in the *Preferences.* The first of these sets the mundane printer characteristics such as paper size, character pitch, and line margins. Specific printer selection is also done here. Due to the graphic requirements of many Amiga applications, such as the font selection in the *Notepad,* the Amiga requires a custom printer driver for different printers. A selection of printer drivers, including popular letter quality, dot matrix, and color printers, is included on the *Workbench* disk. However, the details for creating a custom printer driver are conspicuous by their absence in the currently available Amiga documentation. Refer to the review of the Canon PJ-1080A in last month's *Ahoy!* for more on this topic.

The second *Preferences* printer screen is geared to the graphic capabilities of dot matrix printers. Programs which provide for graphic bit map dumps look for their guiding data here. This screen lets you set the graphic dump's aspect, color, gray scale, or black and white. The last selection also includes a threshold level for which colors will be printed as black and which will be white. All of the *Preferences* settings may be permanently saved to disk or temporarily applied. If saved to disk, the *Preferences* settings will be automatically implemented whenever the *Workbench* disk is rebooted.

Included in *Preferences* is a mini-graphics program for editing the *Workbench* pointer. The drab default arrow, provided with *Workbench,* has been replaced by the stylized *Ahoy!* pointer in our screen photographs. Also on the *Workbench* disk is a more elaborate Icon Editor for customiz-

ing the disk and program icons which are used by *Workbench*.

AMIGADOS

Workbench is beautiful. *Workbench* is fantastic. *Workbench* is easy to use. *Workbench* is also inadequate for "really serious" work with the Amiga. Don't misconstrue our meaning. "Really serious" applications, such as word processors, spreadsheets, databases, you name it, can be and are run directly from *Workbench*. However, many traditional disk tasks, as well as certain specific operations, just cannot be performed from *Workbench*. For these tasks the user must enter *AmigaDOS* directly via a text and keyboard driven command line interface (CLI).

The difference between *Workbench* and *AmigaDOS* is easily illustrated. *Workbench* is inherently qualitative while *AmigaDOS* is quantitative. Whereas *Workbench* graphically depicts an estimate of disk usage via a bar graph, the *AmigaDOS* INFO command returns a precise calculation of available disk space. The appearance of a disk file in a *Workbench* window is contingent on the presence of an associated icon file. These are recognized in a directory listing by the .INFO suffix appended to the file names. If the icon files are not present then even a completely full disk will display an empty window on the *Workbench* screen. Furthermore, none of the *Workbench* file operations can be performed without a corresponding icon which may be nibbled by the mouse.

The power and beauty of *Intuition* and the Amiga's multitasking operating system is illustrated by *Workbench* and the CLI. This combination provides instant gratification for both keyboarders and mouseketeers. The best of both worlds is always available, as *Workbench* and *AmigaDOS* can be run simultaneously.

AMIGA USER GUIDES

Packed with the Amiga is a 3" thick three-ring binder. More than half of this space will be immediately filled by the *Introduction to Amiga* and *Amiga BASIC* manuals included with the computer. The remainder of the space is intended for the documentation which accompanies all of the Amiga's software as published by Commodore. We found that the *Commodore Textcraft* and *Commodore Graphicraft* manuals just about filled the remaining binder space. It is not immediately obvious what must be done once the binder is full, as instructions for ordering additional binders were nowhere to be found.

The accompanying Amiga documentation is among the best we have seen. The descriptions are well-written, profusely illustrated, in color, and printed on high quality stock. Most of the illustrations are actual Amiga screen photographs. The documentation is also inadequate. There is no information on *AmigaDOS* other than numerous references to the *AmigaDOS Manual*, which is not in-

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cluded. The only specific *AmigaDOS* information we found included with the Amiga is in the last part of the *Amiga Tutor* program mentioned above.

The CLI and *AmigaDOS* is not accessible from the *Workbench* as it comes out of the box. The CLI icon has to be turned on in the *Preferences* before it will appear in a *Workbench* window. A quick entry into the CLI can be achieved by interrupting the boot up sequence with a CTRL-D keystroke right after the text prompts appear. This will bring up the CLI while preventing the startup of *Workbench*.

AmigaDOS is a powerful, full-featured operating system. All necessary disk handling and file manipulation commands are supported. In addition, *AmigaDOS* command sequences can be saved in a text file for batch execution. To facilitate batch mode the *AmigaDOS* vocabulary includes branching and conditional commands. A rudimentary help facility is built into the system. Entering a command followed by a question mark will display a parameter template for the command.

The editing facilities of the CLI are extremely limited. Only backspace and delete with cancellation of the entire line are supported. Unlike the C-64, *AmigaDOS* lacks a full screen command editor in immediate mode. This makes casual experimentation with *AmigaDOS* a time-consuming and oftimes frustrating exercise. Experiment you most probably will. The *AmigaDOS Manual*, published by Bantam Books, is not written for those totally unfamiliar with command-driven operating systems. The concisely detailed descriptions will be read and reread many times before total comprehension is attained.

The *Workbench* disk does include two sequential file text editors. ED is a full screen-based editor while EDIT is a line-based editor. Either of these programs can be used to modify or create *AmigaDOS* command files. The first such activity usually involves the S/Startup-sequence file on the *Workbench* disk. This file is executed whenever *Workbench* is booted. It can be changed to go directly to a CLI, prompt the user for the current date and time, and perform numerous other tasks whenever *Workbench* is started. Details on using *AmigaDOS* and both editors are provided in the *AmigaDOS Manual*.

The *AmigaDOS* commands are disk-resident. That is, the command is loaded from disk before execution. Unless told otherwise, an *AmigaDOS* command will operate on the currently logged disk in the current drive. Special command formats are used to direct *AmigaDOS* to the proper disk. The end result is much disk swapping and command parameter entry on single drive systems. A second drive does wonders to alleviate the tedium.

An alternate solution involves creation of a RAM disk and assigning the commands to it. The result is faster execution speed with greater convenience at the expense of available memory. The *AmigaDOS* RAM disk is dynamic in that only the amount of memory required by the assigned commands is allocated.

AmigaDOS, like *Workbench*, is multitasking. Simply use the NEWCLI command to open up additional CLI windows for each task. Tasks can even be run in the background by using the RUN command. This sets up a non-interactive CLI which executes the commands following RUN. Multiple commands can be submitted to RUN by separating them with plus signs. When the tasks are complete, the RUN CLI deletes itself.

The *AmigaDOS* hierarchical file naming structure is worth noting. At the top level is the volume or disk name itself. This is separated from the rest of the name by a colon. The colon is immediately followed by the actual filename or an unlimited series of directory names separated by slashes. The actual filename follows the last slash after the last directory name. Thus a disk or volume may contain any number of directories, each of which may also contain any number of directories, and so on. The chain of directories leading to the desired file is known as a pathname. Specific filenames in *AmigaDOS* need not be unique as long as a unique pathname exists. Each segment of a pathname may contain up to 30 characters with no limit to the total length of the pathname.

AmigaDOS directories appear as drawers on the *Workbench* screen. Opening a drawer may bring out additional drawers or specific tools. It thus becomes obvious that *Workbench* and the CLI are different manifestations of the same thing. The *AmigaDOS* file system greatly facilitates the ordering of the 880 kilobyte capacity on its floppy disks.

The *AmigaDOS* directory is not restricted to a single track of the disk. Filenames are placed on the disk in an apparently haphazard manner as they are required. As the directory grows, so does the disk drive head movement required to trace through a pathname to specified destination file. In a large directory this head movement may consume the bulk of the time required to access a speci-



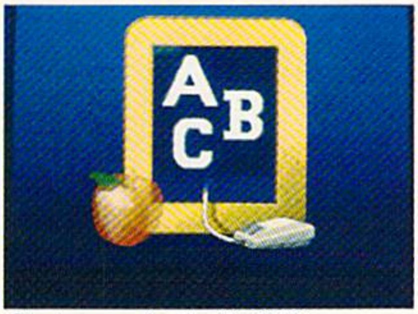
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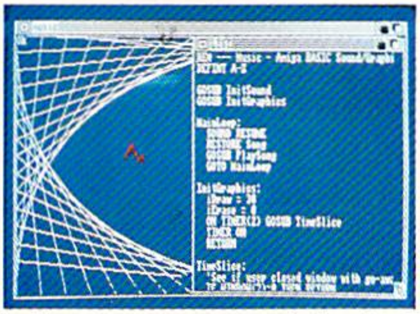
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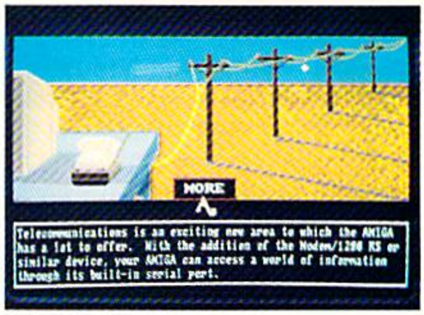
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Center: an AmigaBASIC *screen, with the program output window in the right half and the List window, displaying a segment of the program, at left. The flanking images are sample screens from the supplied* Amiga Tutor.

fic file. It is possible to reorganize the physical layout of the disk directory by using the COPY command to transfer all the files to another disk.

Direct speech capability has been added to version 1.1 of *AmigaDOS*. Since this command is not yet included in the *AmigaDOS'* built-in feature, we will present it in detail here. The command format is:

SAY [options] [text],,,,,,,,,,

The SAY command may be run directly or interactively. Direct mode is defaulted to by simply entering SAY followed by the text to be spoken or the name of an *AmigaDOS* file which contains the text. Yes, *AmigaDOS* will vocalize the contents of a file right off the disk. Interactive mode is entered by typing the SAY command alone. Two windows will appear on the screen. The Phoneme window will display the available options codes followed by the phoneme codes which are actually generated by SAY from the text you type in the Input window.

Table of SAY Options

Option	Result
-f	Uses female voice.
-m	Uses male voice.
-n	Uses natural voice.
-r	Uses robot voice.
-p###	Sets voice pitch from 65-320.
-s###	Sets speech rate from 40-400.
-x file	Says the contents of the specified file.

Note: Multiple options may be separated by spaces.

AmigaDOS has all the requirements for effective and efficient manipulation of the Amiga's resources. However, learning to use *AmigaDOS* effectively will not be a simple task for the average user. Then again, *AmigaDOS* was not created for ease of use. The Amiga's *Workbench* exquisitely fulfills the purpose of a user-friendly interface. Furthermore, Commodore's detailed specification of the *Workbench* routines will help insure that independent software developers will properly propagate the *Workbench's* intended functions. Based on the software we have already seen, this goal has been met. The uniform application of icons and pull-down menus brings the Amiga a giant step closer to the elusive goal of eliminating user manuals.

In brief, *AmigaDOS* fulfills its intended function of providing powerful and efficient access to the Amiga's resources. Those who invest the time to learn its intricacies will find their efforts well-rewarded.

AMIGABASIC

The Amiga is provided with what may very well be the most powerful implementation to date of the BASIC programming language on a personal or impersonal computer. Created by Microsoft, *AmigaBASIC* is upwardly compatible with earlier versions of Microsoft BASIC used by other microcomputers. Most notably, BASIC programs written for the IBM can be transported to the Amiga with minimal modification. The area in which *AmigaBASIC* differs from the earlier ver-

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sions is in the implementation of extensive commands in support of the Amiga's unique hardware capabilities.

By virtue of being written directly in 68000 machine language, the *AmigaBASIC* interpreter is surprisingly compact at only 80 kilobytes (shades of 6502 and BASIC 2.0–how did the C-64 get by on only 8K?). This, if nothing else, demonstrates the hardware gulf which exists between the Amiga and microcomputing's eight bit progenitors.

The *AmigaBASIC* operating environment is a programmer's delight. Two windows will appear when *AmigaBASIC* is first booted. The larger is the Output window, where program results are normally displayed. The smaller is the List window, wherein all program entry and editing is accomplished. As with all other Amiga windows, these two may be moved and resized. If you haven't guessed it by now, *AmigaBASIC* effectively multitasks itself.

The programmer has the option of displaying a program in the List window while the program executes in the Output window. The contents of these windows are completely independent of each other. Add to this bilateral display a built-in single step and continuous trace feature, complete with highlighting of each BASIC line as it executes, and you have an ideal program debugging environment.

Program entry and editing is highly advanced as well. The full screen editor has features which complement the optional use of line numbers with *AmigaBASIC*. That's right, *AmigaBASIC* does not need line numbers! The editor, which runs in a permanent insert mode, lets you cut, paste, and copy BASIC program code. In short, all of the features of a text editor are at your fingertips. Text case is not significant to the editor. However, it will keep track of your use of upper and lower case letters in variable names. All of *AmigaBASIC's* keywords are automatically converted to upper case when the program is listed.

As with most Amiga programs, a set of menus reside in the top bar of



Self-portrait: Amiga as seen through the eyes of the Amiga Tutor *program.*

the Output window. All of *AmigaBASIC's* operating controls reside here. These include the starting and stopping of program execution, toggling of the List window, single step and trace modes, program file management, and the program editing controls. Some of these features may be selected from the keyboard, allowing you to forego the use of the mouse.

As a language, *AmigaBASIC* is highly structured. Along with optional line numbers comes the capability to label statements. True subroutines are supported with both global and local variables. Variable names

PRINTING, PREFERENCES, AND MULTITASKING ON THE AMIGA 1000



Screen one of the Preferences *tool included on the* Workbench *disk.*

Although the Amiga 1000 is a multitasking computer, it is not always obvious how to get it to do so. In fact, the documentation accompanying some applications software will actually prevent you from multitasking if followed blindly. We ran into this limitation when working with *Deluxe Paint* and the graphic printer. The solution to the problem may be applied to other Amiga applications as well.

If you follow the instructions packaged with *Deluxe Paint*, you will boot *Workbench* and the program directly from the original distribution disk. Unfortunately, this will lock you into whatever *Preferences* settings are already on the disk. The result is greatly limited printer options when performing a bit map graphic dump from *Deluxe Paint*.

To get around this we developed the following procedure:

1. Boot up the *Amiga* in the usual fashion from a copy of your own *Workbench* disk.

2. Open a second Command Line Interface (CLI) using the *AmigaDOS* NEWCLI command.

3. Boot *Deluxe Paint* from one of the CLIs following the instructions supplied with the program. For example, the low-res version of the program can be started by simply entering DPAINT from one of the CLIs.

At this point you may proceed to use *Deluxe Paint* in the usual fashion. The big difference comes when you want to run some other task. We will use the Amiga's *Preferences* tool to change the printer's operating modes as an illustration.

When you are ready to print, use the mouse to place the pointer on the *Deluxe Paint* screen's menu bar. Grab the *Deluxe Paint* window by holding down the left mouse button and pull the window down off the bottom of the display. If you have never done this before, hold tight–the



Screen two of Preferences *is the first of two printer selection screens.*

results are impressive. The original pair of CLIs will be visible underneath the *Deluxe Paint* screen.

Click the mouse in the CLI which you did not use to boot *Deluxe Paint*. You may now enter any command you want in the CLI. If necessary, move the CLIs around by grabbing their top bars. For our example we will enter PREFERENCES. The disk will spin and the familiar *Preferences* screen will appear on the display. You will most likely be prompted to place you original *Workbench* disk back into the drive. Since we want to do a graphic bit map dump, click in the Change Printer box to go to the second screen, then click in the Graphic Select



Three digitized Amiga images, the veggie delight and soap opera actress captured with the LIVE! *real-time video frame grabber from A-Squared Systems, 10 Skyway Lane, Oakland, CA 94619 (READER SERVICE NO. 163).*

may contain up to 40 significant characters. Since embedded keywords in variable names are permissable, spaces are no longer optional as in Commodore BASIC 2.0. Data structures support both 16 and 32 bit integers as well as 32 and 64 bit floating point numbers.

Several BASIC demonstration and utility programs are included with *AmigaBASIC.* Among these is an object editor for creation of graphic objects. These images are designed to be manipulated by *AmigaBASIC's* extensive animation commands. The animation, or OBJECT and COLLISION, commands are just one group of *AmigaBASIC's* specialized commands. Others include SOUND and WAVE for music, SAY and TRANSLATE$ for speech, GET and PUT for manipulation of screen images, and of course SCREEN and WINDOW commands for manipulating output.

CHIPS! CHIPS! CHIPS!

The Amiga's magic lies in the technical sophistication of its custom chip set, referring to the bits of refined silicon (the prime component of sand) upon whose surfaces are etched thousands of microscopic transistors. In fact, the entire microcomputer industry owes its very existence to these chips in the form of the microprocessor and memory chips upon which the computer designs are based.

As we indicated last month, the Amiga's three custom chips are actually components of a single superchip. That is, from a machine language programmer's viewpoint they appear as a single functional block. In a fit of whimsy, the chip designers have bestowed the unlikely nomenclature of Agnes, Daphne, and Portia upon these silicon workhorses. Nevertheless, a case can be made for the functional relationship embedded in these names. Agnes is the Address Generator, Daphne is the graPHics chip and Portia handles the I/O PORTs. On less format occasions these ladies have also been addressed as Agnus, Denise, and Paula.

It is possible to assign distinct functions to each chip. Agnes is responsible for all of the Amiga's direct memory access channels (DMA). Agnes also contains the Amiga's coprocessor (copper) and the blitter. The copper is a specialized microprocessor. Although its instruction set is limited to WAIT, MOVE, and SKIP, it can still accomplish amazing feats. The copper uses DMA to obtain its instructions without the attention of the 68000. It has the ability to sense the video beam's display position. When a specified video beam position has been reached, it will update the display chip registers on the fly. This is the mechanism behind the Amiga's dynamic display.

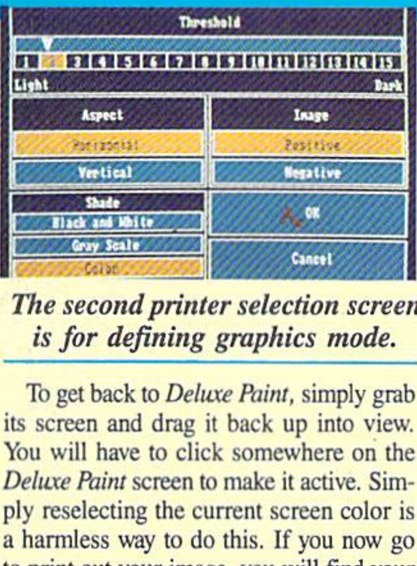
The blitter (which stands for block transfer) would be better named a bimmer (for bit-mapped image manipulator). It has the ability to man-

box to get to the third screen. Several options will now be available to you.

To start with, you may select the type of printout you desire from Black and White, Gray Scale, or Color. If you select Black and White, you may move the pointer to the Threshold scale at the top of the screen and adjust the slider accordingly. This sets the color for which all lighter colors will be printed as white and all darker colors will be printed as black.

You may also choose a positive or negative image, as well as a horizontal or vertical printout on your paper. When you are finished, click in the OK box in order to return to the second *Preferences* screen.

At this point you have one other important control over the printed image. By adjusting the right margin you can control the size of the printed image. The printer driver will automatically adjust the vertical dimension to maintain the proper proportions. When you are finished, click the OK box to return to the first screen. At this point you may click the Use box to implement your selection or the Save box to make the changes a permanent part of your *Workbench* disk.

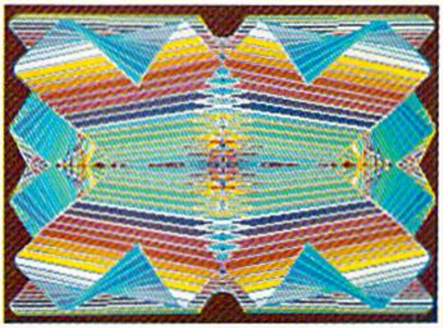


The second printer selection screen is for defining graphics mode.

To get back to *Deluxe Paint,* simply grab its screen and drag it back up into view. You will have to click somewhere on the *Deluxe Paint* screen to make it active. Simply reselecting the current screen color is a harmless way to do this. If you now go to print out your image, you will find your selection to be implemented.

While performing this procedure the Amiga may occasionally put up a requestor for your original *Workbench* disk or the *Deluxe Paint* disk. Just respond as required. Also note that we have shown all *Workbench* commands in upper case, although *Workbench* does not distinguish between case for any commands or file names.





Only a baboon would believe that any amount of monkeying around on another micro would enable it to ape the Amiga's graphic capabilities.

ipulate the contents of memory blocks in very useful ways and at incredible speeds. To achieve a memory move, the blitter requires very little information. It needs only to be told the start and destination addresses, along with the height and width of the block. The blitter can manipulate data from three independent sources. These manipulations can include the combining of the data in any of 256 possible logical operations. The blitter also has built-in graphic capabilities for drawing lines and filling areas of the screen.

Daphne is primarily the graphics chip handling most of the video functions. These include most of the built-in sprite operations. Also found in Daphne are the 32 twelve-bit, color registers responsible for the Amiga's 4096-color display. Daphne can control up to two screens at one time. Screens are the drawing surface upon which the Amiga's output is displayed. They are always the full width of the available viewing surface, but may be any height. Each screen can have its own characteristics in terms of resolution and number of available colors.

Portia houses the Amiga's sophisticated sound generators, as well as the serial and parallel input and output (I/O) functions. Internally Portia has four independent sound channels. These are internally paired and presented as a stereo signal to the outside world. The channels may be independently programmed, or they may be attached so that the output of one modulates the sound of another. Each channel is equipped with a DMA-driven eight-bit digital-to-analog converter. The audio DMA is capable of retrieving two data samples in the interval consumed by a single horizontal video scan line. The Amiga can generate sounds via automatic DMA data retrieval of digitized data. Alternatively, the sound channels can be directly controlled.

The ultimate power of the Amiga's custom chips lies in their DMA capabilities. The chips need only be told what to do and where to find their data. The appropriate operations are then carried out without any further attention by the central microprocessor. This leaves the Amiga's 68000 free to carry out the traditional computational tasks associated with a computer.

FURTHER READING

Although our primary audience consists of C-64 and C-128 users, we know you have been intensely curious about Commodore's new wonder machine. In this two-part presentation we have endeavored to give you some idea of what working with an Amiga is like. If you are seriously considering expanding your computational horizons with an Amiga, you may want some additional information before laying down those hard-earned dollars.

An excellent indepth presentation on many of the Amiga's aspects may be found in the *Amiga Programmer's Guide,* edited by Stephen Levy, $16.95 from COMPUTE! Publications, Inc. This 460 page volume is geared toward the intermediate to advanced programmer. The eight chapters and nine appendices paint a thorough picture of several high interest Amiga topics. These include a thorough introduction to *AmigaBASIC* with details of all the commands, discussion of Amiga graphics by Sheldon Leemon (author of *Mapping the C-64,* reviewed in the June 1985 *Ahoy!*), and a dissertation on Amiga sound. The two chapters (35 pages) on *AmigaDOS* previously appeared in the January, February, and April 1986 issues of *COMPUTE!* magazine.

For advanced programmers there are separate chapters on the C programming language (as implemented by Lattice for the Amiga) and machine language with the 68000. Overall there is sufficient detail in this book to assist you in making an informed decision, as well as provide useful guidance in the event that you do purchase a machine.

(Note: *The AmigaDOS Manual* (Bantam, $24.95), the official reference work for the Amiga, was not received in time for this report.)

CONCLUSIONS

The Amiga appears to be developing nicely, although it is not selling as quickly as Commodore would have liked. As of this writing, total sales are on the order of 50,000 machines. However, we feel that these are significant sales in that the purchasers of Amigas seem to have a definite purpose in mind. The computer has also been snapped up by many developers. Based on reports from Comdex, we can expect to see some truly impressive applications on the market in the near future.

In terms of existing software, *Deluxe Paint* from Electronic Arts has been a smashing success. We estimate that 80 percent of Amiga owners have bought this graphics package, a truly phenomenal proportion.

The Amiga is a unique machine, without peer in the present microcomputer market. We expect it to make a sizeable impression over the next six months as production increases and prices start to drop. In this regard we would like your feedback. If you are planning to buy or have already bought an Amiga, please let us know. We have already received several outstanding programs written in *AmigaBASIC* which are being considered for publication. The future is clearly in your hands. □

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Compiled by Michael R. Davila

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TWO PROGRAMMABLE FUNCTION KEYS

The following program changes the SHIFT RUN/STOP and the LOGO RUN/STOP key combinations to function keys that act, in the direct mode, much like keys f1 through f8 do on the 128. Line 10 does it all by disabling LOAD, running the program, and then directing control to line 50000, if it senses that the LOGO and SHIFT keys are pressed. If they are not, the program continues through to line 20. Line 50000 is the start of your two function key routines.

As an illustration, run the below program. It will list lines 10 through 49998 if LOGO and RUN/STOP are pressed in direct mode. If SHIFT RUN/STOP is pressed, a channel to the disk drive is opened, a file called "YOUR PRG.BU" is scratched, a file named "YOUR PRG" is renamed to "YOUR PRG.BU", the current program in memory is saved as "YOUR PRG" and the channel to the disk drive is closed.

Pressing RUN/STOP and RESTORE disables this utility, and this must be done before loading another program. POKE 816,165 also disables and POKE 816,0 restores.

—Edward Horgan
Coatesville, PA

```
•10 POKE 816,0:IF PEEK(197)>1 THEN 50000
•20 PRINT"YOUR PROGRAM STARTS HERE"
•49999 END
•50000 IF PEEK(653)>1 THEN LIST 10-49998
•50010 A$="YOUR PRG":B$=A$+".BU"
•50020 OPEN15,8,15:PRINT#15,"S:"B$
•50030 PRINT#15,"R:"B$"="A$
•50040 CLOSE15:SAVE A$,8
```

BINARY LOAD AND BINARY SAVE

Binary Load is a relocatable machine language utility for the C-64 which allows you to specify the beginning address of the file being loaded.

Normally, when a non-BASIC file is saved, the file is reloaded into the same location it was saved from. This is understandable when dealing with data that must be placed in the same location to function correctly. However, when dealing with sprite data, hi-res, and relocatable ML files, it is often desirable to have the file load into a new location. With this utility, it shall be done! The syntax for *Binary Load* is similar to that of the BLOAD command of the C-128. STORE-AT is the beginning address of *Binary Load*.

```
SYS STORE-AT,"FILE NAME",DEVICE NUMBER,S
TARTING ADDRESS.
```

This utility can be used from direct and/or program mode. You may also use strings and variables with the syntax above. Improper syntax will produce an error message. Also, if the utility is called from direct mode (loc. $9D = 0), the ending address of the load will be displayed.

```
•100 REM*PROGRAM-ID.          BINARY LOAD
•110 REM*AUTHOR.              SHAWN K. SMITH
•150 PRINTCHR$(147)CHR$(18)TAB(14)"BINARY
 LOAD
•160 PRINT:INPUT"STORE AT ? 700[5"[LEFT]"
]";S
•200 FORD=S TO S +63:READY:POKED,Y:NEXT
•220 DATA 234,032,253,174,032,158,173,032
•230 DATA 163,182,032,189,255,032,253,174
•240 DATA 032,138,173,032,247,183,162,008
•250 DATA 165,020,160,000,032,186,255,032
•260 DATA 253,174,032,138,173,032,247,183
•270 DATA 169,000,166,020,164,021,032,213
•280 DATA 255,165,157,240,009,169,013,032
•290 DATA 210,255,152,032,205,189,096,234
•300 PRINT:PRINTCHR$(18)"SYS"S"[LEFT],FIL
 E NAME,DV#,LOAD ADDR.
```

Binary Save is the partner to *Binary Load.* This fully relocatable ML utility for the C-64 allows you to save any section of memory. *Binary Save* can be used to save hi-res screens, sprite data, and screen memory, just to name a few. Files saved with this utility can be loaded back into the same location with a non-relocatable load (e.g., LOAD"FILE",8,1). This utility can also be used to back up ML programs if the starting and ending addresses are known. The syntax for *Binary Save* is similar to that of the BSAVE command of the C-128 computer.

```
SYS STORE-AT,"FILE NAME",DEVICE NUMBER,S
TART ADDR,END ADDR + 1
```

Note that you must add one to the ending address of the area to be saved. Moreover, strings and variables are allowed. Feel free to use the utility within a program as well as direct mode.

```
•100 REM*PROGRAM-ID.          BINARY SAVE
•110 REM*AUTHOR.              SHAWN K. SMITH
•150 PRINTCHR$(147)CHR$(18)TAB(14)"BINARY
 SAVE
•160 PRINT:INPUT"STORE AT [5"[RIGHT]"]830
[5"[LEFT]"]";S
```

```
•200 FORD=S TO S +61:READY:POKE D,Y:NEXT
•215 DATA 234,032,253
•220 DATA 174,032,158,173,032,163,182,032
•230 DATA 189,255,032,253,174,032,138,173
•240 DATA 032,247,183,160,001,166,020,169
•250 DATA 001,032,186,255,032,253,174,032
•260 DATA 138,173,032,247,183,132,251,133
•270 DATA 252,032,253,174,032,138,173,032
•280 DATA 247,183,168,166,020,169,251,076
•290 DATA 216,255,234
•300 PRINT:PRINTCHR$(18);"SYS"S"[LEFT],FI
 LE NAME,DV#,START,END+1
```

–Shawn K. Smith
Bronx, NY

AUDIBLE CASSETTE

C-64 users who have a Datasette (or compatible cassette deck such as the Data Master) can't normally get any audio feedback from their tapes, due to the fact that the Datasette doesn't include a speaker. This program will play back through the TV or monitor speaker the signal contained on a cassette tape.

```
•10 FOR K = 49152 TO 49176
•20 : READ B
•30 : POKE K,B
•40 NEXT K
•50 SYS 49152
•60 DATA 120,169,0,141,17,208,169,7,133
•70 DATA 1,173,13,220,41,16,240,2,169,15
•80 DATA 141,24,212,76,10,192
```

By listening to the data pulses on a tape with the help of this program, you can tell, for instance, where one program ends and another begins, or whether there are any programs on that tape at all. By listening carefully to the pulses you might be able to tell where you've made recording mistakes, such as SAVEing one file at a point on the tape where a previous file already existed.

This program is not limited to computer tapes; it will play back any voice or music tape, though the fidelity will not be good. Disable the program with RUN/STOP-RESTORE.

–John Krutch
New Smyrna Beach, FL

FASTER COMMODORES

One of the Commodore 128's nicer features is the FAST command, which kicks the processor into high gear and doubles the speed of most operations. What's not generally known is that the same speedup is available in C-64 mode too.

POKE53296,1 in either mode jumps the system clock to 2 megahertz instead of the powerup 1 MHz. But in the 64 mode you pay a price for this speed–a totally disintegrated 40-column screen display, and loss of access to the disk drive.

The following program shows what I mean (note that POKE53296,0 in lines 90 and 160 restores things to normal):

```
•10 PRINT"[CLEAR]":IF DS$<>"" THEN PRINT"
 PLEASE CHANGE TO C-64 MODE.":END
•20 PRINT"SPEED TEST/C-64 MODE[DOWN]"
•30 PRINT"WORKING[3"."][DOWN]"
•40 J=TI
•50 FORX=0TO5000:NEXT
•60 J1=TI:PRINT"REGULAR TIME= "(J1-J)/60
•70 POKE53296,1:J=TI
•80 FOR X=0TO5000:NEXT
•90 J1=TI:POKE53296,0:PRINT"POKE TIME= "(
 J1-J)/60
•100 PRINT"[DOWN][DOWN]STAND BY FOR DISK
 TEST."
•110 PRINT"WAIT ABOUT 30 SECONDS[3"."]THE
 N"
•120 PRINT"IF SCREEN STAYS MESSY, PRESS"
•130 PRINT"RUN/STOP AND TYPE GOTO160."
•140 FORX=0TO10000:NEXT:POKE53296,1:OPEN2
 ,8,2,"0:XTXTXT,S,W"
•150 PRINT#2,"TEST":CLOSE2
•160 POKE53296,0:END
```

Try this in C-128 mode (you'll have to skip line 10). Disk access is now restored–and you might be surprised to see

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Reader Service No. 199

that the C-64 mode is the faster of the two. That's because the BASIC 7.0 of the C-128 contains more commands for the interpreter to scan while deciphering program lines. Substituting FAST and SLOW for the POKEs yields the same result, with one exception: instead of going berserk with squirming checkerboards, the 40-column screen will simply disappear.

And just in case you're wondering—no, POKE53296,1 won't work on a generic Commodore 64. Sorry.

—Bert Halverson
Joplin, MO

DISK CHECKER

The idea behind *Disk Checker,* written to check the alignment of my drive, is that I should be able to get the drive to read a block from any track at any time. The program will read sector 1 from each of the tracks 1, 18, and 35. Track 1 is on the innermost area of the disk, track 18 about the middle, and track 35 the outermost area. The program reads track 1 sector 1, then track 35 sector 1, then track 18 sector 1. I chose this order to get the drive to go all over the disk surface to get the data, thereby insuring that both of the extreme surface areas are tested. The hard part was to find a disk that I wrote on back when I first got the drive. When I bought the drive it worked fine, but now, a year later, the heads could be a bit out of alignment, but I wouldn't notice it on a disk that I wrote on last month. I'll need one that I wrote on a looong time ago to be sure that it's still looking in the same place on the disk for each track. All the program does is read a block with the "U1" command, putting the data read into one of the RAM buffers in the drive. When you run the program, the busy light on the drive will come on briefly three times, once for each block it reads. If the drive has any trouble reading the data, the light will flicker and you may get head rapping. If you get flickering or noise, you *may* need to get your drive aligned. But this program is not a cure-all, just an indicator.

—Donald Graham
Baltimore, MD

```
•10 T=1:GOTO50
•20 IFT=18THENEND
•30 IFT=1THENT=35:GOTO50
•40 IFT=35THENT=18
•50 OPEN15,8,15
•60 OPEN2,8,2,"#"
•70 PRINT#15,"U1,2"0;T,1
•80 PRINT"TRACK"T
•90 CLOSE2:CLOSE15
•100 GOTO20
```

TIME OUT

Wow! It's finally happened. You're about to set an all-time high on that incredibly difficult game you've been playing. Oh, oh...the telephone is ringing. Aw heck, let it ring. It rings again and you notice your hand is beginning to cramp around the joystick. Let it cramp. Another ring, your hand cramps more, and now hunger is making you weak. Oh, Lord of the Games, can it be? So near and yet so far from the world's greatest score, only to succumb to human frailty? If only you could call "time out."

Do it! *Time Out* will let you call "time out." Just press the f7 function key and everything will come to a screeching halt (game clocks too). Then you can answer the telephone and listen to Aunt Martha complain about the arthritis in her jaw while you soak your cramping hand in Epsom salts. And, of course, you'll be able to get a bite to eat, too. After all, breaking records takes energy. Once that important business is out of the way, press any other key (except SHIFT, COMMODORE LOGO, or CONTROL) to continue your assault on that elusive record. If you're using a joystick, you can twiddle it or press the fire button to continue.

Time Out works with BASIC and machine language programs that don't use an IRQ interrupt. The loader pokes the ML data into memory from 700 to 736. Just load and run *Time Out*, type SYS 700, press RETURN, and it'll be waiting for your call (RUN STOP-RESTORE will disable it). Now load the games you want to play and have at 'em.

Better yet, by appending *Time Out* to your own programs, they'll have it built in. Just add a command to activate it (e.g.: 150 SYS700). Now save the new version of your program. Presto, no muss, no fuss. Just relax and play.

Since *Time Out* is fully relocatable, you can load it anywhere you want. If you have a program that uses locations 700 to 736, you might want to load *Time Out* at 828, or 49152, etc. Just change the value of X in line 10 to the address you want to load it at. It's as simple as that. *Time Out* will modify itself to run at the new location.

Time Out works with either joystick- or keyboard-driven programs. If you happen to be using the keyboard and want to have another key activate *Time Out,* you can change the 3 in line 50 to 4 (f1), 5 (f3), or 6 (f5).

Next time you need relief, call *Time Out.*

—Buck Childress
Salem, OR

```
•10 X=700:REM *** CHANGE THIS TO RELOCATE
 ***
•20 FORJ=XTOX+36:READA:POKEJ,A:NEXTJ
•30 X1=INT(X/256):POKEX+1,X+13-(X1*256):P
OKEX+3,X1:END
•40 DATA169,201,162,2,120,141,20,3,142,21
,3,88,96,165,203,201
•50 DATA3:REM *** CHANGE THIS TO USE A DI
FFERENT KEY ***
•60 DATA208,15,32,159,255,32,228,255,208,
7
•70 DATA173,0,220,201,127,240,241,76,49,2
34
```

TRIM

For the C-64

By Buck Childress

Do your program listings look out of shape? Do extra spaces and REMs have 'em resembling a hippo in a tree? If you want to cut that excess weight from your programs, carve away with *Trim.*

Trim will quickly and easily remove the spaces, REMs, or both from your program listings. You'll be able to put more goodies on each line, save memory, and, believe it or not, some of your programs might even run a little faster!

After saving a copy of *Trim,* run it. The loader will POKE the Machine Language data into memory, where it will live in harmony with BASIC, and you can *Trim* away (what pun?). Now load any BASIC program you want to work on, type SYS 50000, and press RETURN.

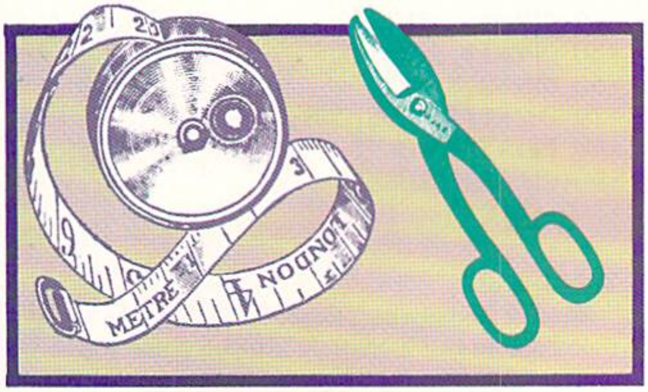
Trim will ask if you want to delete the spaces from your program. Press the Y (yes) key if you do, or the N (no) key if you don't. Press the DELETE key if you make a mistake. *Trim* won't delete spaces within quotes. (Those PRINT statements might look a little strange if it did.)

Next, *Trim* will ask if you want to delete the REMs. Press the Y or N key as appropriate. If you press Y, the REM and anything following it (on that particular line) will disappear. Should a colon (:) precede a REM, it will be deleted as well (gotta keep things tidy). As with spaces, if the REM is in quotes, it won't be deleted. If an entire line is a REMark, everything will be deleted. All that will remain is the line number followed by a colon. As a result, any IF/THENs, GOTOs, or GOSUBs aimed at the line will still work, without your having to change anything.

Finally, *Trim* asks if you're sure about the changes. Press N if you want to change your answers. Press Y to *Trim* (sorry). You can exit *Trim* at any time by pressing the STOP key.

Give *Trim* a whirl. It'll gobble up those spaces and REMs and never get full. ☐

SEE PROGRAM LISTING ON PAGE 97



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MUSIC STUDIO
Activision
Commodore 64
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Activision has taken advantage of the marvelous sound capabilities of the Amiga by developing a package called *Music Studio,* and C-64 and C-128 owners have benefitted because of it. While the C-64 version could never compare soundwise, it is an excellent translation.

As with most music programs for the C-64, you have three voices to work with and a preprogrammed group of instruments available for your use. There are plenty of sample songs, so you can start listening almost as soon as you boot up. Thanks to Activision's quick loader, that will be in only a minute or so.

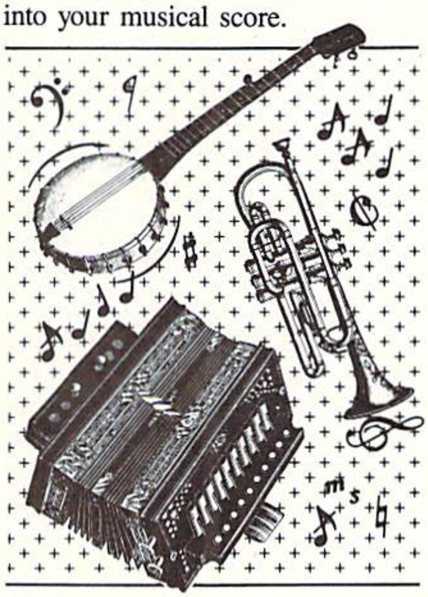
The program is entirely icon driven and uses a joystick in place of the Amiga's mouse. Keyboard input is only necessary for entering filenames when doing saves or making copies of files. When loading or saving a file under an existing filename, the joystick is all you need.

Music is entered or composed by placing notes on a staff rather than by performing a song on the keyboard. As the cursor is moved around on the staff, it sounds at each line or space, allowing you to hear how it will sound if placed in a particular location. Hitting the joystick's fire button places the note on the staff. To remove a note, you need only place the cursor on the existing note and hit the fire button again.

The sheet music thus produced can be played or printed. All of the commonly used music symbols can be placed on the staves, including notes, rests, bars, key signatures, sharps, flats, naturals, ties, slurs, and time signatures. Lyrics can be typed in as well.

The main screen contains icons to call up other options, some icons for immediate changes, and the staves for composing on. The cursor takes on different appearances depending on the type of activity. When over the icons, it's a baton. When on the staves, it looks like the note of your choice.

A small trashcan is used for deleting current work. There are two icons for playing your song. One just plays the song; the other scrolls the notes along with the music. One icon, labeled Words, is used to enter words into your musical score.



Also on this screen is the name of the instrument currently in use. Instrument names are color coded to make identifying which notes belong to which instrument easy. You can use as many as 15 different instruments in each song. And you can change all notes in a particular instrument to another instrument very easily.

The sound engineering room (their terminology) is used to create, modify, and assign sounds which you'll be using. This is a fairly complicated process, but they've laid it out well. You can play the song you're working on as you are adjusting parameters to see what effect your changes are having on the sound of the instruments. In addition to the instruments provided, *Music Studio* includes a file of sound effects that can be used.

If you have a MIDI-interfaced synthesizer, you can use *Music Studio* to play it. However, you can only play one voice and the synthesizer must use one of its preprogrammed voices. You can't ship your voices from the Commodore over to the synthesizer, so the sound engineering isn't useful with a synthesizer. You need to purchase the Passport MIDI interface separately.

The editing features are very nice. There are cut and paste commands for deleting, moving, and copying sections. You can easily insert white space as needed. Moving around is made easier by commands that let you page along, instead of moving one note at a time.

But one of the best features is the ability to transpose to a new key instantly. Instead of having to rework the whole song by individual notes, the program will automatically make the changes with only a few joystick maneuvers.

Another sub-menu lets you paint music on the staff as rectangles whose different sizes represent the different note durations. This is a boon to children who don't yet know anything about note lengths, but who can tell that longer rectangles play for a longer period of time? Since you can switch back and forth between the two, you can create in the paintbox and then take a look at how it appears in normal music notation.

One interesting note: interspersed through the manual are sections on using the Atari version (both are on the disk). Comparing the capabilities of the Atari version to the Commodore version will make you glad you bought a Commodore. (Curiously, the Amiga and Atari ST versions show just about the same amount of difference.)

With the large number of music programs available for the Commodore, it would seem that the world didn't need another, but Activision has done a creditable job of putting everything into this one. It certainly has all the features I would look for in a sound processor for the C-64.

The $34.95 suggested list price is

highly competitive. Some less comprehensive programs sell for more than that. Broderbund's *Music Shop,* for example, lists for $44.95 and has fewer amenities.

Activision, Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043 (phone: 415-960-0410).

–Cheryl Peterson

FLEET SYSTEM 3
Professional Software
Commodore 128
Disk; $79.95

Fleet System 3, an advanced, two-disk word processing system for the C-128, not only takes advantage of the 128's features, but includes a 100,000-word spellchecker and a thesaurus. Though new, *Fleet System 3* is well-developed, since it has evolved from PSI's proven Commodore word processor, *Fleet System 2.*

The user's manual contains a wealth of useful information about all facets of the program. Several chapters are devoted to the edit functions, output, and spellchecking and thesaurus operations. A reference section summarizes all commands, while another chapter clearly explains program error messages.

Besides its word processing features, *Fleet System 3* provides invaluable disk drive access. You may initialize, format, or validate disks, and scratch or rename files. Disk errors may even be read from within the application, without disturbing the text one iota.

A multitude of printer drivers are included, making *FS3* compatible with most printers. Information is provided on interfaces for non-Commodore printers. Displaying a high level of consideration for user's wallets, PSI also provides instructions on how to build a cable allowing 80-column output on composite monitors such as the Commodore 1702. Several companies which manufacture these cables are also listed for those willing to spend dollars instead of time.

The basic word processing functions will not be covered in this review; instead the focus will be on *Fleet System 3's* advanced features.

Twin Screens

Fleet System 3 has a split personality. That is, there are two separate areas for text entry, the main text area and the extra text area. Essentially, the 128's available memory is partitioned into two sections of unequal size. The main area, where most documents are created and edited, accommodates about 650 80-column lines or 430 120-column lines. The extra text area handles roughly 150 80-column lines, or 100 in 120-column mode.

This extra work space does not heavily impact on the overall size of a document because size really depends on available disk space. However, the second screen does add a great deal of versatility to *FS3.*

While both areas may be used for documents, creative use of the extra space is limited only by your imagination. For example, you could load the program's HELP text into secondary memory, accessing it via the function key command <FCN x>. This switch between the two text areas is pretty near instantaneous.

Another use is to display a disk directory. Because the directory command erases all text, you normally don't want to view one from within an important document. Here's where the extra area comes to the rescue.

Besides these incidental uses, PSI has other tricks up their collective sleeve. Both "tricks" entail variables.

The Append feature makes it possible for users to create one or more lines of text, give them a unique, coded name, and then place them anywhere in a main text document as many times as needed.

The data merge capability also makes use of *Fleet System 3's* variables, though in a slightly different manner. 128 owners can merge a list of items (sequentially) into predesignated "variable blocks" in the main text area. Form letters, I hear you calling.

Whenever you want to place certain words or expressions several times in a single document, use the append function. For example, you might be writing a term paper or a business report. In it a few words or

phrases are repeated often. Instead of typing them in each time, merely define a phrase and place it where desired.

In practice there are two types of appends, those shorter than a screen line and those longer than a screen line. Though the setup procedures are slightly different, one example should suffice.

For text longer than one screen line, press the <UP ARROW> key, type in a coded name, another <UP ARROW>, and a <RETURN>. Then you enter the phrase, ending it with another <RETURN>. The coded name could be a mnemonic to help you recall the meaning of the text being appended. For example, the code "FS" could be used to recall the phrase "Fleet System 3". This reduces keystrokes and helps eliminate errors.

Returning to the main area you simply press <FCN a> and type FS where you want the phrase to appear. Used in conjunction with the Insert mode, you can even place appended phrases within existing text.

Personalized form letters are created via the data merge capabilities of *Fleet System 3*. Not only can you do a mass mailing, but you can also produce a series of prewritten letters by selecting previously created paragraphs, titles and phrases, etc.

A sample document entitled "merge letter" is included on the program disk to lessen the learning curve. After loading it, switch to the secondary text area. Load the appropriate file ("list" works with "merge letter") and return to the main text area.

Type <FCN i> to insert the first batch of variables into the receiving document. Though each block is merged sequentially, you can use the list again and again during a single session. An override capability is provided for those wishing to manually enter text into merge-designated areas.

If the merge routine sounds too manually oriented to be of much use for large scale projects, don't despair. *FS3* provides a fast track automatic merge and print capability so you can churn out correspondence en masse.

Automerge also uses both text areas, though less intervention is required. When the "list" file is too large to fit into the secondary text area, automerge is accomplished by directly accessing files residing on a data disk.

'Rithmetic Too

FS3's numeric tabs automatically right-align columns of numbers. Dollar signs, decimal points, commas, and positive and negative whole numbers can be entered. (Negatives are handled by a minus sign or enclosed in parentheses.)

While column tabulation is nice for layouts, it shines when you activate the program's addition and subtraction functions. After columns are created, users place the cursor below the column and press <FCN = > to total the results.

In addition (no pun intended) to entire column manipulation, *FS3* performs calculations on designated lines within columns or ranges of columns spread throughout documents. As with other functions, just a few keystrokes and you're in business.

A Global Outlook

All C-128 word processors perform local functions on a single file loaded into memory. *Fleet System3*, however, also works with disk resident files, and not just linking them. With *FS3* you may find or search and replace words or phrases across all files on a disk. Though there is a global copy feature, it only works with dual floppy drives.

Divide and Focus

When writing large documents there is often a need to split or merge paragraphs. Though this can be accomplished in most programs by adding or removing a <RETURN> character and spaces, *Fleet System 3* has special commands just for these purposes. Good writers, whether amateur or professional, will use these commands to better focus paragraph themes.

Spell Checker

Fleet System 3's spellchecker is one

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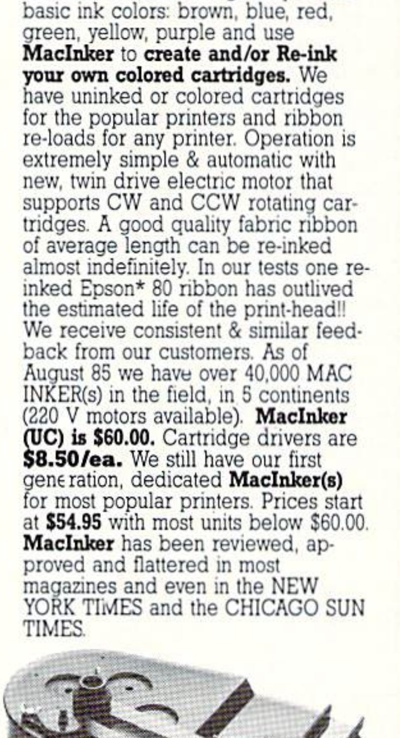
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of the star attractions. Not only is it large (90,000 word dictionary included with room for another 10,000 entries), but also it is fast. Professional claims that any size document can be checked in 45 seconds.

Suspect words may be added to the dictionary disk, ignored, or corrected. Spellchecked text is not saved until the data disk is swapped for the dictionary disk and a save routine is performed. One more thing: added words are read to the dictionary after all suspect words are processed, not as each word is added. This summarized addition procedure is instrumental in speeding up the spellcheck process.

A separate "options" program enhances the basic functions. This utility compresses dictionary files, prints the user dictionary, and searches for or deletes words.

A full statistical report can also be generated, supplying information on the number of words, unique words, sentences, and paragraphs. Average word length and the number of words per sentence or paragraph are calculated, as well as the number of sentences per paragraph.

The only drawback is having to load the "options" program independently of the main *FS3* program. Perhaps that was the only way PSI could build such a fleet-footed spellchecker.

Roget's Revenge

People spend hundreds of dollars for word processors on systems costing 10 times as much as the 128 and still don't get a thesaurus. That's how sophisticated *Fleet System 3* really is.

The thesaurus disk must be in the drive and the document in memory to search for antonyms and synonyms. Either type the word in question or position the cursor to retrieve words or phrases from the text. Then press <FCN SHIFT a> for an antonym or <FCN SHIFT s> for a synonym. In the blink of an eye, voilà!, a window pops up with the desired information. Due to disk limitations and the nature of the entries (mostly verbs, adverbs, and adjectives), alternatives will not always be available.

Conclusion

Fleet System 3 provides advanced word processing capabilities for a minimum investment, making it one of the most cost effective productivity packages for the 128. It is a well-behaved, evenly balanced, professionally executed package worth many times its retail price.

Professional Software, Inc., 51 Fremont Street, Needham, MA 02194.

—Ted Salamone

NEWWORD
NewStar Software
C-128 (CP/M mode)
Disk; $125.00

WordStar was one of the earliest and to date probably the most popular word processing program sold. Though there were a few deficiencies in it, they were overlooked by the majority of users because it quickly established itself as a standard. It was menu-driven, and though many complaints were heard about its difficulty to learn, with sufficient use the commands became second nature.

A group of defectors from MicroPro formed NewStar Software and developed an improved *WordStar: NewWord.* While it is command- and file-compatible with *WordStar,* features have been added to *NewWord* to make it a better program than its illustrious predecessor.

NewWord contains all the page formatting commands needed: margin settings, line spacing, lines per page, line centering, hanging indents, variable tabs, headers and footers, header and footer margins, page numbering, and widow prevention (conditional page breaks). These are set using easily remembered dot commands. A command is provided to alternate page numbers on opposite corners. Page numbers can be placed anywhere in headers and footer.

Formatting commands are divided into two categories, onscreen and printout only. The onscreen formatting includes options like soft hyphens, word wrap on/off, justification on/off, and forced page breaks. The printout only commands allow

for special control of printers and include bidirectional printing on/off, character width, microjustification, column number for page number, omit page numbers, set page number, and page offset. The page offset is an automatic indentation that can be used to compensate for borders on pages and other non-standard paper conditions. The set page number can be used to start page numbering at a number other than one, for instance when printing a file that is a continuation of an earlier file.

Justification comes in two forms, between words and microjustification (which inserts spaces between letters). Not all printers support microjustification, so it may need to be suppressed to print with certain printers.

It should be noted that using the install program that comes with *NewWord* allows you to set the default values for all of these options. The default values assigned when the product is shipped are suitable for most applications. But using install, you could override the defaults to use the alternate pitch (12 cpi instead of 10), a 65 (instead of 60) character line, double spacing (instead of single), no word wrap, and microjustification off. A 15-minute procedure customizes *NewWord* to perform at your defaults.

Of course, any default values can be overridden using explicit commands in your documents.

One of the most frequent complaints about *WordStar* or *NewWord* is the difficulty of using the scrolling commands. With arrow keys available, I rarely use the control functions to move the cursor around onscreen. But they do exist. The most commonly used are the up and down by screen, Control R for up, Control C for down. Though they take a lot of getting used to, the scrolling functions are easily as nice as any found in Commodore word processors.

Of course, *NewWord* has find and replace, as well as find a page. The block manipulations are easy to use and include copy, move, and delete. In addition, you can read and write blocks of text to and from disk. This makes it easy to make boilerplate documents and then just fill in the blanks.

File manipulations from within documents can prevent many headaches. Documents can be deleted to make more room when you find you've exceeded disk space. *NewWord* automatically creates a backup file as you work, so in most cases if an accident happens you won't be totally lost. In addition, a save and return feature can be used to quickly update your file on disk and leave you at your last work position.

The print controls supported include doublestrike, boldface, sub- and superscripts, underlining, overprinting, strikeout and alternate pitch. In addition, the user can specify six custom print controls using dot commands, and these commands can be reassigned at will. The default values for these six custom commands can be set using the install program.

The merge print feature of *NewWord* can be used to create data files with boilerplate text to be inserted into your documents. Mass mailings can be handled easily using this feature. Variables inserted in the document are replaced at print time by specific data read in from the data files that are also created using *NewWord*. In many cases, information can be read in from database files created with programs like *dBase II, DataStar,* and *Filebase.*

On top of all this, *NewWord* has an undo command that will recall the last group of characters deleted. For instance, it is easy to hit control Y (delete a line) instead of control T (delete a word). Using control U, you could recover that lost line.

NewWord also handles column manipulation, making it great for laying out newsletters and magazine pages. A column replace mode fills areas from which text is moved with blanks. This makes it possible to leave white space on a page for pictures or other illustrations to be inserted later.

If that isn't enough, *NewWord* is shipped with *The Word Plus.* One of the better spelling checkers available in CP/M, *TWP* is used to scan a file for words that do not match those

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found in its dictionary. The user can add his own words to the dictionary so they will not be flagged as unrecognized by *TWP.* This program used to sell for $125, so getting it and *NewWord* for $125 is a real bargain.

One outstanding feature of *NewWord* has been its ability to work with most printers. The printer files on the disk allow the user to specify which printer he is using and *NewWord* will automatically send the correct codes to access the printer's "extra" features. Several generic printers are offered: draft, typewriter, and simple. Should your printer not be one supported, one of these files should work. But most of the more popular printers (even Hewlett Packard's laser printer) are supported.

One really nice feature in this area is the data printer option. *NewWord* uses a few non-standard formatting techniques, so its files are sometimes difficult to send by modem. If the receiver is using 8 bit protocol, he may receive the file correctly, but still not be able to read it with his text editor because *NewWord* files are not standard ASCII files.

You needn't worry about it, though. If you use the printer called DATA, *NewWord* will convert your file to a standard ASCII file that can easily be sent over a modem or read by another word processor.

Because of the peculiarities of the Commodore computer and attaching printers to it, you may have to work to get a decent printout. For one thing, you will almost certainly need to set your printer interface in the proper mode. And while customer support at *NewStar* has never disappointed me, I don't know how much help they will be in regards to correctly configuring printer interfaces. Trial and error may be your only choice. There is a print file on the *NewWord* disk that can be used to test your printer's compatibility, however.

As you may have noticed, I have little derogatory to say about *NewWord*, I must admit that every Commodore word processor I have ever reviewed has had to stand up to the *NewWord* standard. I have yet to find a Commodore word processor to replace *NewWord.* Although I still use *NewWord* with my Osborne, this is only because I already have the proper printer cables to do so. This review (and almost everything I've written in the past three years) was written using *NewWord.*

NewWord, NewStar Software, 1601 Oak Park Blvd., Pleasant Hill, CA 94523 (phone: 415-932-2526).

–Cheryl Peterson

SCUTTLEBUTT

Continued from page 14

output at 120 characters per second and near letter quality at 30 cps. It is necessary to add a plug-in interface cartridge for the 64 and 128 ($60.00). A push button-activated front panel controls 11 format and print functions, including pitch, type style, print mode, margins, and forward and reverse paper feed. The included rear tractor feed provides a quick tear feature.



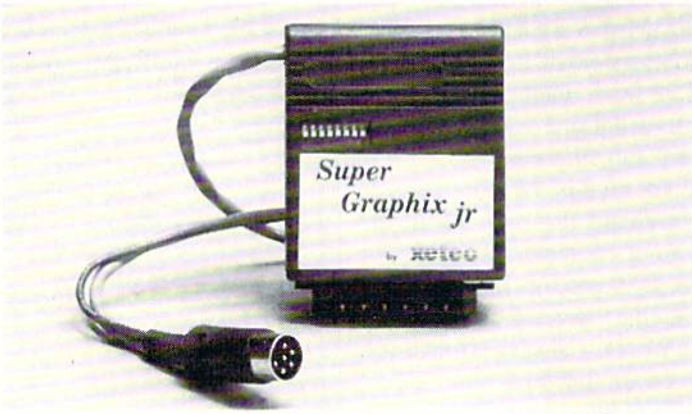
NL-10 prints 120 cps in draft mode.
READER SERVICE NO. 203

Star Micronics Inc., 212-986-6770 (see address list, page 14).

Next Month

Next month's installment of *Scuttlebutt* will run you down on all the Commodore-compatible products preannounced at the Summer '86 Consumer Electronics Show (taking place as we write these words). Commodore itself will be showing a 3.5" drive for use with the C-64 and C-128, as well as a new color monitor and printer cosmetically matched to the 128. We can only hope that this summer's roster of third-party releases will be more encouraging than last winter's (see April '86, page 8). Find out next month.

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DISK CATALOGER

For the C-64

By Pasquale Longo

Disk Cataloger is a machine language program designed to catalog a number of disks to form a large master file on a single disk. The program automatically reads the directory of any desired disk and adds user-selected program names to the master file. The selected program names may be amended.

Disk Cataloger maintains a cross-reference between the program names and the disk names and IDs, allowing the quick and easy determination of which disk contains a specific program. The program is able to catalog more than 800 program names.

USING THE PROGRAM

Load *Disk Cataloger* with

```
LOAD"DISK CATALOGER",8,1
```

then

```
SYS 49152
```

You will be presented with a menu. Select option R to catalog a disk. When instructed to, insert the disk you wish to catalog. Then press the RETURN key. The program will read the disk directory, display the disk name and ID, and wait for verification that the correct disk was actually inserted.

After a Y response, the program will display the program names contained on that disk, one at a time. You may add the program name to the master file by pressing fl, or not add the name by pressing f3. Pressing f5 will allow you to amend the program name. (Note: the program names are only changed in the master file; the input disk is not changed in any way.)

After all program names have been presented, *Disk Cataloger* will sort the master file. If an N response is entered, the program will ask you to insert the correct disk.

- Option S will save the master file (from the computer's memory) onto the master disk.
- Option L is used to load the master file into memory.

The options outlined below require the master file to be in the computer's memory.

- Option P will print the contents of the master file to the screen.
- Option H will give a hard copy of the master file.

When requesting a hard copy of the master file, you should make sure that the printhead of your printer is aligned at the top of a page, that is, just past the perforation. This is because *Disk Cataloger* keeps track of where it is on the paper, and skips over the perforations. The program is set up to print 50 program names per page.

- Option D is used to delete a program name from the master file.
- Option F is used to find a program name–the disk name and ID will be indicated–in the master file.
- Option Q quits the *Disk Cataloger.*

THE FIRST TIME

First format a blank disk to become the master disk (the SAVE/LOAD FILE disk). Load and run *Disk Cataloger.*

Select option R to read a disk's directory and select/amend the program names of that disk. Catalog any other disks you want to. Then, select option S to save the master file on your master disk.

When you use *Disk Cataloger* to catalog more disks, you must select option L to load the master file. The new disks cataloged will be added to the file –remember to save the updated master file. ☐

SEE PROGRAM LISTING ON PAGE 98

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ERRATUM – *Star Strike* (June '86)

Due to conflicting memory addresses between the SS portion of *Star Strike* and the *Flankspeed Listing Creator,* an incorrect ML listing was created. The STAR STRIKE BASIC listing and SPRITES portions of the program are correct as printed in the June issue; enter the version of SS printed here. The instructions for entering SS remain the same.

We apologize for the extra work created for you by this error. But we're certain that *Star Strike* will prove worth the effort.

```
8000: A9 2F 8D 18 D4 A9 01 8D 8B
8008: 76 93 8D 7F 93 8D 77 93 4B
8010: 8D 83 93 A9 64 8D 72 93 56
8018: 8D 74 93 8D 7E 93 A9 C8 BF
8020: 8D 81 93 A9 00 8D 10 D0 DA
8028: 8D 17 D0 A9 12 8D 08 D4 C3
8030: A9 FA 8D 0D D4 8D 14 D4 BA
8038: 8D 06 D4 A9 F2 8D 17 D4 B6
8040: A9 AC 8D 04 D0 A9 B8 8D E8
8048: 02 D0 A9 88 8D 00 D0 A9 55
8050: 80 8D 05 D0 A9 E6 8D 01 53
8058: D0 8D 03 D0 A9 03 8D 1D E1
8060: D0 AD 1C D0 09 C3 8D 1C 42
8068: D0 A9 07 8D 27 D0 8D 28 25
8070: D0 8D 29 D0 8D 2D D0 8D E1
8078: 2E D0 A9 06 8D 25 D0 A9 54
8080: 00 8D 26 D0 A9 01 8D 2A 67
8088: D0 A9 08 8D 2B D0 8D 2C 4E
8090: D0 A9 5D 8D FA 47 A9 5C 3E
8098: 8D F8 47 A9 78 8D F9 47 57
80A0: A9 07 8D 15 D0 A2 00 A9 11
80A8: 10 9D 00 44 9D 00 45 9D 1B
80B0: 00 46 E8 E0 00 D0 F2 9D 22
80B8: 00 47 E8 E0 E8 D0 F8 A9 26
80C0: 00 85 FB A9 60 85 FC A0 6F
80C8: 00 A9 00 91 FB C8 C0 00 89
80D0: D0 F9 E6 FC A5 FC C9 80 6C
80D8: D0 ED A2 00 A0 00 A9 00 84
80E0: 85 FB A9 60 85 FC AD 14 B0
80E8: DC 2D 24 DC D0 04 A9 01 73
80F0: 91 FB C8 C0 00 D0 EF E6 AF
80F8: FC A5 FC C9 80 D0 E7 A2 3E
8100: 00 A9 70 9D 2E 44 E8 E0 F3
8108: 06 D0 F8 A9 00 AA 9D 78 42
8110: 61 E8 E0 D0 D0 F8 A2 00 78
8118: BD 6A 8A C9 FF F0 0A BD 4D
8120: 6A 8A 9D 78 61 E8 4C 18 D9
8128: 81 78 A9 C6 8D 14 03 A9 E0
8130: 86 8D 15 03 58 A0 00 A2 F7
8138: 00 E8 E0 28 D0 FB C8 C0 80
8140: 17 D0 F4 20 06 85 20 F5 DE
8148: 85 20 49 86 20 83 81 20 03
8150: 2A 82 20 7D 83 20 52 83 14
8158: 20 B9 8A 20 68 8B 20 90 81
8160: 8C AD 15 D0 29 C0 D0 08 43
8168: AD 06 94 D0 03 EE 5D 93 64
8170: AD 5D 93 F0 0B A9 80 8D C2
8178: 0B D4 A9 00 8D 20 D0 60 E0
8180: 4C 35 81 AD 6E 93 F0 03 27
8188: 4C EF 81 AD 06 94 D0 01 60
8190: 60 AD 15 D0 29 40 F0 01 DF
8198: 60 AD 24 DC F0 01 60 EE E8
81A0: 6F 93 AD 6F 93 C9 01 F0 10
81A8: 01 60 A9 64 8D FE 47 AD 99
81B0: 10 D0 29 BF 8D 10 D0 A5 8E
81B8: A2 4A 4A 8D 70 93 18 A9 43
81C0: 3B 6D 70 93 8D 0D D0 A9 82
81C8: 01 20 91 B3 20 97 E0 A5 6D
81D0: 8F 8D 70 93 C9 30 90 EF 6C
81D8: AD 70 93 8D 0C D0 AD 15 B7
81E0: D0 09 40 8D 15 D0 A9 02 1A
81E8: 8D 6E 93 8D 41 93 60 AD E8
81F0: 6F 93 C9 0A F0 04 EE 6F 1B
81F8: 93 60 A9 00 8D 6F 93 AD D4
8200: 41 93 29 01 F0 0A AD FE A6
8208: 47 C9 68 F0 11 EE FE 47 B8
8210: 18 AD 0D D0 6D 41 93 8D 83
8218: 0D D0 EE 41 93 60 A9 00 C3
8220: 8D 6E 93 EE 04 94 CE 06 0C
8228: 94 60 AD 15 D0 29 40 D0 EA
8230: 01 60 AD FE 47 C9 68 F0 A8
8238: 01 60 AD 78 93 C9 01 F0 0F
8240: 04 EE 78 93 60 A9 00 8D D6
8248: 78 93 AD 04 94 F0 03 4C DA
8250: D0 82 AD 0D D0 CD 74 93 05
8258: F0 04 90 0A B0 0E A9 01 51
8260: 8D 76 93 4C 6F 82 EE 0D 32
8268: D0 4C 6F 82 CE 0D D0 AD D1
8270: 10 D0 29 40 F0 08 A9 01 5E
8278: 8D 71 93 4C 83 82 A9 00 07
8280: 8D 71 93 AD 73 93 CD 71 07
8288: 93 F0 04 90 16 B0 25 AD 3B
8290: 72 93 CD 0C D0 F0 04 90 C6
8298: 0A B0 19 A9 01 8D 77 93 AF
82A0: 4C C7 82 AD 0C D0 D0 08 9A
82A8: AD 10 D0 49 40 8D 10 D0 2F
82B0: CE 0C D0 60 AD 0C D0 C9 11
82B8: FF D0 08 AD 10 D0 49 40 A9
82C0: 8D 10 D0 EE 0C D0 60 AD 09
82C8: 76 93 2D 77 93 D0 01 60 3D
82D0: A9 01 20 91 B3 20 97 E0 79
82D8: A5 8F F0 F9 8D 74 93 AD 3C
82E0: 74 93 C9 32 B0 06 0E 74 1E
82E8: 93 4C DF 82 AD 74 93 C9 AA
82F0: C8 90 0C 38 AD 74 93 E9 2E
82F8: 0A 8D 74 93 4C EC 82 A9 FD
8300: 01 20 91 B3 20 97 E0 A5 A4
8308: 8F 8D 75 93 AD 75 93 C9 AE
8310: 94 90 03 4E 75 93 AD 24 61
8318: DC 29 01 D0 1B 18 A9 AD 7A
8320: 6D 75 93 8D 72 93 B0 08 E2
8328: A9 00 8D 73 93 4C 46 83 7C
8330: A9 01 8D 73 93 4C 46 83 85
8338: 38 A9 AD ED 75 93 8D 72 BE
8340: 93 A9 00 8D 73 93 A9 00 BB
8348: 8D 76 93 8D 77 93 8D 04 0A
8350: 94 60 AD 59 93 8D 03 94 05
8358: A2 00 AD 03 94 F0 10 A9 EA
8360: 02 9D 35 44 CE 03 94 E8 C8
8368: E0 14 F0 10 4C 5A 83 E0 69
8370: 14 F0 09 A9 10 9D 35 44 4F
8378: E8 4C 5A 83 60 AD 85 93 B2
8380: F0 03 4C A4 84 AD 15 D0 7D
8388: 29 40 D0 01 60 A9 00 8D 5B
8390: 87 93 8D 89 93 8D 8B 93 03
8398: AD 10 D0 29 01 F0 05 A9 F0
83A0: 01 8D 87 93 AD 00 D0 8D 56
83A8: 86 93 AD 10 D0 29 02 F0 6D
83B0: 05 A9 01 8D 89 93 18 AD D0
83B8: 02 D0 69 18 8D 88 93 AD 64
83C0: 89 93 69 00 8D 89 93 AD 9F
83C8: 10 D0 29 40 F0 05 A9 01 B3
83D0: 8D 8B 93 AD 0C D0 8D 8A 20
83D8: 93 AD 87 93 F0 0B AD 89 68
83E0: 93 D0 06 AD 8B 93 F0 15 1E
83E8: 60 AD 87 93 CD 8B 93 90 8F
83F0: 0C F0 01 60 AD 86 93 CD E4
83F8: 8A 93 90 01 60 AD 8B 93 D5
8400: CD 89 93 90 0C F0 01 60 D9
8408: AD 8A 93 CD 88 93 90 01 4F
8410: 60 AD 24 DC C9 0A 90 01 84
8418: 60 A9 00 8D 90 93 AA A9 28
8420: 70 8D 8C 93 A9 E5 9D 00 6B
8428: 9A 8D 91 93 A9 6F 9D 80 AC
8430: 9A AD 0D D0 8D 92 93 E8 F2
8438: 38 AD 91 93 ED 92 93 F0 48
8440: 29 4A 4A F0 16 8D 93 93 B9
8448: 38 AD 91 93 ED 93 93 8D F5
8450: 91 93 9D 00 9A 20 EB 84 3E
8458: 4C 37 84 CE 91 93 AD 91 93
8460: 93 9D 00 9A 20 EB 84 4C 09
8468: 37 84 CA 8E 8E 93 AD 10 5D
8470: D0 29 EF 8D 10 D0 AD 0C 82
8478: D0 8D 08 D0 AD 10 D0 29 67
8480: 40 F0 08 AD 10 D0 09 10 61
8488: 8D 10 D0 A9 69 8D FC 47 DB
8490: AD 0D D0 8D 09 D0 AD 15 46
8498: D0 09 10 8D 15 D0 A9 01 A0
84A0: 8D 85 93 60 AD 8D 93 C9 40
84A8: 06 F0 04 EE 8D 93 60 A9 BD
84B0: 00 8D 8D 93 AD 94 93 F0 26
84B8: 03 4C DA 84 AE 8E 93 BD F5
84C0: 00 9A 8D 09 D0 BD 80 9A 9B
84C8: 8D FC 47 BD 00 9A C9 E5 A2
84D0: D0 03 EE 94 93 CA 8E 8E A3
84D8: 93 60 A9 00 8D 94 93 8D B9
84E0: 85 93 AD 15 D0 29 EF 8D 34
84E8: 15 D0 60 EE 90 93 AD 90 80
84F0: 93 29 01 F0 0A AD 8C 93 77
84F8: C9 69 F0 03 CE 8C 93 AD BC
8500: 8C 93 9D 80 9A 60 AD 18 FE
8508: 94 C9 00 F0 04 EE 18 94 F6
8510: 60 A9 00 8D 18 94 AD 00 02
8518: DC 8D 42 93 29 01 D0 0A 5D
8520: AD 05 D0 C9 28 90 03 CE F7
8528: 05 D0 AD 42 93 29 02 D0 7D
8530: 0A AD 05 D0 C9 DC B0 03 18
8538: EE 05 D0 AD 42 93 29 04 AD
8540: D0 41 AD 10 D0 29 04 D0 DE
8548: 0A AD 04 D0 C9 0E 90 33 70
8550: 4C 60 85 AD 04 D0 D0 08 DD
8558: AD 10 D0 49 04 8D 10 D0 A2
8560: CE 04 D0 AD 00 D0 D0 08 5B
8568: AD 10 D0 49 01 8D 10 D0 AF
8570: CE 00 D0 AD 02 D0 D0 08 69
8578: AD 10 D0 49 02 8D 10 D0 C0
8580: CE 02 D0 AD 42 93 29 08 D6
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8588: D0 4E AD 10 D0 29 04 F0 54
8590: 0A AD 04 D0 C9 4C B0 40 24
8598: 4C AA 85 AD 04 D0 C9 FF 61
85A0: D0 08 AD 10 D0 49 04 8D E2
85A8: 10 D0 EE 04 D0 AD 00 D0 CB
85B0: C9 FF D0 08 AD 10 D0 49 2B
85B8: 01 8D 10 D0 EE 00 D0 AD 95
85C0: 10 D0 29 02 D0 0F AD 02 5C
85C8: D0 C9 FF D0 08 AD 10 D0 CA
85D0: 49 02 8D 10 D0 EE 02 D0 4C
85D8: AD 3D 93 D0 17 AD 6B 93 EB
85E0: D0 12 AD 42 93 29 10 D0 51
85E8: 0B A9 01 8D 3C 93 AD 05 AE
85F0: D0 8D 67 93 60 AD 3C 93 28
85F8: F0 4E A9 5E 8D FB 47 AD BE
8600: 04 D0 8D 06 D0 AD 05 D0 BC
8608: 8D 67 93 AD 10 D0 29 F7 40
8610: 8D 10 D0 AD 10 D0 29 04 3A
8618: F0 08 AD 10 D0 09 08 8D 3E
8620: 10 D0 A9 D2 8D 40 93 A9 88
8628: 81 8D 0B D4 A9 E5 8D 07 3B
8630: D0 AD 15 D0 09 08 8D 15 48
8638: D0 A9 20 8D 43 93 A9 01 E1
8640: 8D 3D 93 A9 00 8D 3C 93 A5
8648: 60 AD 6C 93 C9 01 F0 04 16
8650: EE 6C 93 60 A9 00 8D 6C 43
8658: 93 AD 3D 93 F0 67 AD 43 B3
8660: 93 29 01 F0 0A AD FB 47 0A
8668: C9 64 F0 03 EE FB 47 AD 6A
8670: 07 D0 CD 67 93 F0 25 38 5F
8678: AD 07 D0 ED 67 93 4A 4A 7B
8680: F0 10 8D 44 93 38 AD 07 D3
8688: D0 ED 44 93 8D 07 D0 4C D0
8690: 9C 86 AD 43 93 29 01 F0 53
8698: 03 CE 07 D0 38 AD 40 93 FB
86A0: E9 06 8D 16 D4 8D 08 D4 73
86A8: 8D 40 93 CE 43 93 AD 43 A0
86B0: 93 D0 12 AD 15 D0 29 F7 DB
86B8: 8D 15 D0 A9 80 8D 0B D4 C3
86C0: A9 00 8D 3D 93 60 AD 45 1C
86C8: 93 F0 03 20 A8 88 AD 46 95
86D0: 93 F0 03 20 1A 89 AD 1E E7
86D8: D0 29 F7 8D 3F 93 D0 03 FE
86E0: 4C 63 88 AD 45 93 F0 03 93
86E8: 4C B7 87 AD 15 D0 29 08 39
86F0: D0 03 4C B7 87 AD FB 47 41
86F8: C9 64 F0 03 4C B7 87 A9 50
8700: 10 8D 48 93 A2 00 AD 15 DE
8708: D0 2D 48 93 F0 08 AD 3F C7
8710: 93 2D 48 93 D0 10 AD 48 83
8718: 93 D0 03 4C B7 87 0E 48 61
8720: 93 E8 E8 4C 06 87 AD 07 14
8728: D0 8D 4D 93 E8 BD 08 D0 E6
8730: 8D 4F 93 CA 20 3C 8A AD FF
8738: 51 93 C9 03 B0 D8 AD 10 31
8740: D0 29 08 D0 08 A9 00 8D 52
8748: 4A 93 4C 52 87 A9 01 8D 84
8750: 4A 93 AD 06 D0 8D 49 93 1D
8758: AD 10 D0 2D 48 93 D0 08 C8
8760: A9 00 8D 4C 93 4C 6D 87 B8
8768: A9 01 8D 4C 93 BD 08 D0 17
8770: 8D 4B 93 20 E0 89 AD 53 68
8778: 93 D0 9B AD 52 93 C9 09 DE
8780: B0 94 A9 01 8D 45 93 8D 64
8788: 6B 93 A9 00 8D 3D 93 BD 4D
8790: 08 D0 8D 06 D0 E8 BD 08 7C
8798: D0 8D 07 D0 AD 10 D0 2D 8A
87A0: 48 93 D0 0B AD 10 D0 29 10
87A8: F7 8D 10 D0 4C B7 87 AD 48
87B0: 10 D0 09 08 8D 10 D0 A9 BA
87B8: 00 8D 4A 93 8D 4C 93 8D 1F
87C0: 4E 93 AD 10 D0 29 01 F0 4C
87C8: 03 EE 4A 93 38 AD 00 D0 4F
87D0: E9 0A 8D 49 93 AD 4A 93 BA
87D8: E9 00 8D 4A 93 AD 10 D0 BC
87E0: 29 02 F0 03 EE 4C 93 18 E6
87E8: AD 02 D0 69 26 8D 4B 93 65
87F0: AD 4C 93 69 00 8D 4C 93 55
87F8: AD 15 D0 29 10 F0 2C AD 90
8800: 09 D0 C9 E0 90 25 AD 10 F7
8808: D0 29 10 F0 03 EE 4E 93 D6
8810: AD 08 D0 8D 4D 93 20 66 8B
8818: 88 AD 6D 93 F0 0D AD 15 10
8820: D0 29 EF 8D 15 D0 A9 00 27
8828: 8D 6D 93 AD 15 D0 29 20 93
8830: F0 31 AD 0B D0 C9 E0 90 17
8838: 2A A9 00 8D 4E 93 AD 10 39
8840: D0 29 20 F0 03 EE 4E 93 1F
8848: AD 0A D0 8D 4D 93 20 66 C5
8850: 88 AD 6D 93 F0 0D AD 15 48
8858: D0 29 DF 8D 15 D0 A9 00 4F
8860: 8D 6D 93 4C 31 EA AD 4A 4F
8868: 93 F0 0B AD 4C 93 D0 06 5C
8870: AD 4E 93 F0 15 60 AD 4A 5E
8878: 93 CD 4E 93 90 0C F0 01 4A
8880: 60 AD 49 93 CD 4D 93 90 AA
8888: 01 60 AD 4E 93 CD 4C 93 27
8890: 90 0C F0 01 60 AD 4D 93 0E
8898: CD 4B 93 90 01 60 EE 46 6C
88A0: 93 EE 55 93 EE 6D 93 60 5C
88A8: AD 56 93 D0 31 AD 48 93 CB
88B0: 29 30 F0 06 EE 19 94 4C E9
88B8: BD 88 EE 57 93 EE 56 93 B1
88C0: AD 48 93 49 FF 2D 15 D0 A6
88C8: 8D 15 D0 A9 70 8D FB 47 27
88D0: A9 45 8D 16 D4 8D 08 D4 A2
88D8: A9 07 8D 58 93 60 AD 68 79
88E0: 93 C9 02 F0 04 EE 68 93 20
88E8: 60 A9 00 8D 68 93 AD 58 82
88F0: 93 F0 13 CE 58 93 EE FB 2E
88F8: 47 AD 58 93 C9 04 D0 05 7D
8900: A9 80 8D 0B D4 60 AD 15 BA
8908: D0 29 F7 8D 15 D0 A9 00 17
8910: 8D 56 93 8D 45 93 8D 6B E6
8918: 93 60 AD 55 93 D0 11 AD 32
8920: 47 93 F0 03 4C AA 89 AD 1D
8928: 5B 93 F0 03 4C 77 89 60 B8
8930: A9 00 8D 55 93 AD 59 93 EA
8938: F0 20 CE 59 93 A9 0C 8D 48
8940: 20 D0 A9 10 8D 5A 93 8D F3
8948: 0F D4 A9 15 8D 12 D4 A9 09
8950: 01 8D 5B 93 A9 07 8D 5C 68
8958: 93 60 A9 35 8D 0F D4 A9 46
8960: 81 8D 12 D4 A9 70 8D F8 F6
8968: 47 8D F9 47 A9 03 8D 17 CF
8970: D0 A9 01 8D 47 93 60 AD 62
8978: 6A 93 C9 04 F0 04 EE 6A 92
8980: 93 60 A9 00 8D 6A 93 AD 57
8988: 5C 93 F0 0D CE 5C 93 CE 04
8990: 5A 93 AD 5A 93 8D 0F D4 8B
8998: 60 A9 00 8D 20 D0 8D 5B 0A
89A0: 93 8D 46 93 A9 84 8D 12 69
89A8: D4 60 AD 69 93 C9 04 F0 47
89B0: 04 EE 69 93 60 A9 00 8D 38
89B8: 69 93 AD F8 47 C9 77 F0 D5
89C0: 07 EE F8 47 EE F9 47 60 87
89C8: A9 80 8D 12 D4 AD 15 D0 FA
89D0: 29 FC 8D 15 D0 A9 01 8D A2
89D8: 5D 93 A9 00 8D 17 D0 60 49
89E0: 38 AD 49 93 ED 4B 93 8D FD
89E8: 5E 93 AD 4A 93 ED 4C 93 34
89F0: 0D 5E 93 90 1B AD 49 93 26
89F8: 8D 60 93 AD 4A 93 8D 61 F4
8A00: 93 AD 4B 93 8D 62 93 AD 51
8A08: 4C 93 8D 63 93 4C 28 8A 6B
8A10: AD 4B 93 8D 60 93 AD 4C 18
8A18: 93 8D 61 93 AD 49 93 8D 46
8A20: 62 93 AD 4A 93 8D 63 93 26
8A28: 38 AD 60 93 ED 62 93 8D 73
8A30: 52 93 AD 61 93 ED 63 93 9D
8A38: 8D 53 93 60 AD 4D 93 CD 69
8A40: 4F 93 90 0F AD 4D 93 8D DE
8A48: 64 93 AD 4F 93 8D 65 93 57
8A50: 4C 5F 8A AD 4D 93 8D 65 08
8A58: 93 AD 4F 93 8D 64 93 38 3A
8A60: AD 64 93 ED 65 93 8D 51 CB
8A68: 93 60 00 0C 12 10 91 92 AE
8A70: 64 00 00 24 49 92 E4 49 03
8A78: 93 00 00 9E 20 41 E2 04 F2
8A80: CF 00 00 41 82 04 08 11 31
8A88: 3E 00 00 01 82 82 92 12 71
8A90: 0C 00 00 80 40 FF A0 00 FD
8A98: C8 C0 43 D0 FB EE 20 D0 12
8AA0: A5 C6 D0 0F AD 00 DC 29 A0
8AA8: 10 F0 03 4C 96 8A E6 C6 C7
8AB0: 4C B3 8A A9 00 8D 20 D0 63
8AB8: 60 AD 66 93 D0 01 60 AD A0
8AC0: 7A 93 F0 03 4C 2D 8B A9 71
8AC8: 01 CD 06 94 90 01 60 AD D1
8AD0: 15 D0 29 80 F0 01 60 AD 60
8AD8: 24 DC F0 01 60 EE 7B 93 2A
8AE0: AD 7B 93 C9 01 F0 01 60 BA
8AE8: A9 64 8D FF 47 AD 10 D0 5A
8AF0: 29 7F 8D 10 D0 A5 A2 4A 9A
8AF8: 4A 8D 7C 93 18 A9 3B 6D 4B
8B00: 7C 93 8D 0F D0 A9 01 20 48
8B08: 91 B3 20 97 E0 A5 8F 8D A8
8B10: 7C 93 C9 30 90 EF AD 7C C4
8B18: 93 8D 0E D0 AD 15 D0 09 B4
8B20: 80 8D 15 D0 A9 02 8D 7A C7
8B28: 93 8D 7D 93 60 AD 7B 93 77
8B30: C9 0A F0 04 EE 7B 93 60 57
8B38: A9 00 8D 7B 93 AD 7D 93 3D
8B40: 29 01 F0 0A AD FF 47 C9 24
8B48: 68 F0 11 EE FF 47 18 AD AE
8B50: 0F D0 6D 7D 93 8D 0F D0 1C
8B58: EE 7D 93 60 A9 00 8D 7A 6A
8B60: 93 EE 05 94 CE 06 94 60 46
8B68: AD 15 D0 29 80 D0 01 60 D7
8B70: AD FF 47 C9 68 F0 01 60 E9
8B78: AD 79 93 C9 01 F0 04 EE E1
8B80: 79 93 60 A9 00 8D 79 93 32
8B88: AD 05 94 F0 03 4C 0E 8C AA
8B90: AD 0F D0 CD 7E 93 F0 04 F2
8B98: 90 0A B0 0E A9 01 8D 7F A9
8BA0: 93 4C AD 8B EE 0F D0 4C D4
8BA8: AD 8B CE 0F D0 AD 10 D0 1F
8BB0: 29 80 F0 08 A9 01 8D 80 0C
8BB8: 93 4C C1 8B A9 00 8D 80 9D
8BC0: 93 AD 82 93 CD 80 93 F0 EA
8BC8: 04 90 16 B0 25 AD 81 93 0C
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8BD0: CD 0E D0 F0 04 90 0A B0 BD
8BD8: 19 A9 01 8D 83 93 4C 05 92
8BE0: 8C AD 0E D0 D0 08 AD 10 90
8BE8: D0 49 80 8D 10 D0 CE 0E CE
8BF0: D0 60 AD 0E D0 C9 FF D0 49
8BF8: 08 AD 10 D0 49 80 8D 10 F6
8C00: D0 EE 0E D0 60 AD 7F 93 BF
8C08: 2D 83 93 D0 01 60 A9 01 29
8C10: 20 91 B3 20 97 E0 A5 8F 43
8C18: F0 F9 8D 7E 93 AD 7E 93 62
8C20: C9 32 B0 06 0E 7E 93 4C 3F
8C28: 1D 8C AD 7E 93 C9 C8 90 B4
8C30: 0C 38 AD 7E 93 E9 0A 8D B5
8C38: 7E 93 4C 2A 8C A9 01 20 18
8C40: 91 B3 20 97 E0 A5 8F 8D E0
8C48: 84 93 AD 84 93 C9 94 90 15
8C50: 03 4E 84 93 AD 24 DC 29 91
8C58: 01 D0 1B 18 A9 AD 6D 84 A6
8C60: 93 8D 81 93 B0 08 A9 00 F8
8C68: 8D 82 93 4C 84 8C A9 01 14
8C70: 8D 82 93 4C 84 8C 38 A9 53
8C78: AD ED 84 93 8D 81 93 A9 78
8C80: 00 8D 82 93 A9 00 8D 7F DA
8C88: 93 8D 83 93 8D 05 94 60 48
8C90: AD 96 93 F0 03 4C B7 8D ED
8C98: AD 15 D0 29 80 D0 01 60 08
8CA0: A9 00 8D 98 93 8D 9A 93 BF
8CA8: 8D 9C 93 AD 10 D0 29 01 1F
8CB0: F0 05 A9 01 8D 98 93 AD B8
8CB8: 00 D0 8D 97 93 AD 10 D0 D0
8CC0: 29 02 F0 05 A9 01 8D 9A B4
8CC8: 93 18 AD 02 D0 69 18 8D 04
8CD0: 99 93 AD 9A 93 69 00 8D D0
8CD8: 9A 93 AD 10 D0 29 80 F0 30
8CE0: 05 A9 01 8D 9C 93 AD 0E 0A
8CE8: D0 8D 9B 93 AD 98 93 F0 41
8CF0: 0B AD 9A 93 D0 06 AD 9C F8
8CF8: 93 F0 15 60 AD 98 93 CD 9A
8D00: 9C 93 90 0C F0 01 60 AD CC
8D08: 97 93 CD 9B 93 90 01 60 22
8D10: AD 9C 93 CD 9A 93 90 0C 86
8D18: F0 01 60 AD 9B 93 CD 99 AE
8D20: 93 90 01 60 AD 14 DC C9 0E
8D28: 0A 90 01 60 A9 00 8D 01 5C
8D30: 94 AA A9 70 8D 02 94 A9 57
8D38: E5 9D 00 9B 8D 9D 93 A9 BF
8D40: 6F 9D 80 9B AD 0F D0 8D 84
8D48: 9E 93 E8 38 AD 9D 93 ED 68
8D50: 9E 93 F0 29 4A 4A F0 16 38
8D58: 8D 9F 93 38 AD 9D 93 ED 1E
8D60: 9F 93 8D 9D 93 9D 00 9B 8B
8D68: 20 FE 8D 4C 4A 8D CE 9D A5
8D70: 93 AD 9D 93 9D 00 9B 20 3C
8D78: FE 8D 4C 4A 8D CA 8E 8F 12
8D80: 93 AD 10 D0 29 DF 8D 10 49
8D88: D0 AD 0E D0 8D 0A D0 AD FB
8D90: 10 D0 29 80 F0 08 AD 10 D1
8D98: D0 09 20 8D 10 D0 A9 69 14
8DA0: 8D FD 47 AD 0F D0 8D 0B 99
8DA8: D0 AD 15 D0 09 20 8D 15 D8
8DB0: D0 A9 01 8D 96 93 60 AD F1
8DB8: 00 94 C9 06 F0 04 EE 00 01
8DC0: 94 60 A9 00 8D 00 94 AD 2F
8DC8: 95 93 F0 03 4C ED 8D AE 5C
8DD0: 8F 93 BD 00 9B 8D 0B D0 B6
8DD8: BD 80 9B 8D FD 47 BD 00 43
8DE0: 9B C9 E5 D0 03 EE 95 93 18
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8DE8: CA 8E 8F 93 60 A9 00 8D FC
8DF0: 95 93 8D 96 93 AD 15 D0 65
8DF8: 29 DF 8D 15 D0 60 EE 01 C5
8E00: 94 AD 01 94 29 01 F0 0A FC
8E08: AD 02 94 C9 69 F0 03 CE 42
8E10: 02 94 AD 02 94 9D 80 9B A4
8E18: 60 A9 00 8D 0D D0 8D 0B 26
8E20: D0 AD 24 DC 29 01 F0 03 BD
8E28: EE 08 94 AD 1D D0 09 60 B8
8E30: 8D 1D D0 AD 17 D0 09 10 5A
8E38: 8D 17 D0 A9 01 8D 2B D0 E1
8E40: 8D 2C D0 AD 1C D0 29 BF 4E
8E48: 8D 1C D0 A9 79 8D FE 47 B9
8E50: A9 06 8D 2D D0 A9 7B 8D 3E
8E58: FD 47 A9 7E 8D FC 47 AD 45
8E60: 24 DC 8D 88 93 AD 88 93 D4
8E68: C9 28 90 F3 AD 88 93 8D 36
8E70: 0C D0 8D 0A D0 78 A9 C3 9B
8E78: 8D 14 03 A9 91 8D 15 03 FD
8E80: 58 AD 15 D0 09 60 8D 15 78
8E88: D0 A9 00 8D 0E D4 8D 11 12
8E90: 94 A9 05 8D 00 D4 8D 13 D6
8E98: 94 A9 03 8D 01 D4 8D 0F D9
8EA0: D4 8D 12 94 8D 14 94 A9 89
8EA8: 21 8D 04 D4 8D 12 D4 AD 52
8EB0: 10 94 F0 01 60 A0 00 A2 EA
8EB8: 00 E8 E0 1E D0 FB C8 C0 F6
8EC0: 17 D0 F4 AD 15 94 D0 03 C8
8EC8: 20 06 85 20 F5 85 20 49 79
8ED0: 86 20 E3 8E 20 64 8F 20 1E
8ED8: 4F 90 20 AC 90 20 CB 8F 91
8EE0: 4C AF 8E AD 0E 94 F0 01 AD
8EE8: 60 AD 0F 94 C9 04 F0 04 5D
8EF0: EE 0F 94 60 A9 00 8D 0F 2A
8EF8: 94 AD 0D D0 C9 C8 F0 0D A9
8F00: AD 24 DC C9 50 B0 06 EE 6E
8F08: 0D D0 EE 0B D0 AD 08 94 FA
8F10: F0 2A AD 10 D0 29 40 F0 14
8F18: 0D AD 0C D0 C9 28 D0 15 87
8F20: A9 00 8D 08 94 60 AD 0C 0E
8F28: D0 C9 FF D0 08 AD 10 D0 2A
8F30: 49 60 8D 10 D0 EE 0C D0 14
8F38: EE 0A D0 60 AD 10 D0 29 1A
8F40: 40 D0 0D AD 0C D0 C9 18 CA
8F48: D0 13 A9 01 8D 08 94 60 61
8F50: AD 0C D0 D0 08 AD 10 D0 42
8F58: 49 60 8D 10 D0 CE 0C D0 1C
8F60: CE 0A D0 60 AD 15 D0 29 27
8F68: 08 F0 5F AD FB 47 C9 64 DF
8F70: D0 58 AD 07 D0 8D 4D 93 8D
8F78: AD 0D D0 8D 4F 93 20 3C D0
8F80: 8A A9 00 CD 51 93 B0 01 19
8F88: 60 A9 00 8D 4A 93 8D 4C D7
8F90: 93 AD 10 D0 29 08 F0 03 D7
8F98: EE 4A 93 AD 06 D0 8D 49 C0
8FA0: 93 AD 10 D0 29 40 F0 03 20
8FA8: EE 4C 93 18 AD 0C D0 69 83
8FB0: 0C 8D 4B 93 AD 4C 93 69 20
8FB8: 00 8D 4C 93 20 E0 89 A9 5A
8FC0: 00 CD 52 93 B0 01 60 EE 75
8FC8: 17 94 60 AD 15 D0 29 10 A1
8FD0: F0 01 60 AD 16 94 F0 03 6F
8FD8: 4C FB 8F AD 17 94 D0 01 DB
8FE0: 60 EE 0E 94 EE 16 94 A9 16
8FE8: 00 8D 08 94 A9 76 8D DE 9F
8FF0: 91 A9 70 8D E2 91 A9 70 B8
8FF8: 8D FD 47 EE 2C D0 AD 12 77
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9000: 94 C9 10 D0 03 4C 31 90 50
9008: EE 11 94 D0 03 EE 12 94 06
9010: EE 13 94 D0 03 EE 14 94 12
9018: AD 11 94 8D 0E D4 AD 12 9B
9020: 94 8D 0F D4 AD 13 94 8D 09
9028: 00 D4 AD 14 94 8D 01 D4 B6
9030: 60 A9 80 8D 04 D4 8D 12 C0
9038: D4 AD 15 D0 29 9F 8D 15 0C
9040: D0 A9 7C 8D DE 91 A9 7A 59
9048: 8D E2 91 EE 10 94 60 AD EB
9050: 0D D0 C9 C8 F0 01 60 A9 BC
9058: 00 8D 4A 93 8D 4C 93 8D BE
9060: 4E 93 AD 10 D0 29 01 F0 EB
9068: 03 EE 4A 93 AD 00 D0 8D 44
9070: 49 93 AD 10 D0 29 02 F0 F7
9078: 03 EE 4C 93 18 AD 02 D0 E2
9080: 69 30 8D 4B 93 AD 4C 93 14
9088: 69 00 8D 4C 93 AD 10 D0 ED
9090: 29 40 F0 03 EE 4E 93 18 D6
9098: AD 0C D0 69 16 8D 4D 93 11
90A0: AD 4E 93 69 00 8D 4E 93 09
90A8: 20 66 88 60 AD 07 94 F0 52
90B0: 03 4C 34 91 AD 6D 93 D0 45
90B8: 01 60 18 AD 0D D0 69 0C 33
90C0: 8D 09 D0 A9 00 8D 87 93 7A
90C8: AD 10 D0 29 40 F0 03 EE A3
90D0: 87 93 18 AD 0C D0 69 0C 04
90D8: 8D 08 D0 AD 87 93 69 00 71
90E0: 8D 87 93 AD 87 93 F0 08 4B
90E8: AD 10 D0 09 10 8D 10 D0 FE
90F0: AD 15 D0 09 10 8D 15 D0 11
90F8: A9 00 8D 00 D4 8D 0E D4 75
9100: 8D 86 93 8D 87 93 8D 88 66
9108: 93 EE 01 D4 A9 02 8D 0F A8
9110: D4 A9 81 8D 04 D4 A9 21 41
9118: 8D 12 D4 A9 00 A8 AA 20 A9
9120: DB FF EE 07 94 EE 0E 94 18
9128: EE 15 94 AD 15 D0 29 FB 79
9130: 8D 15 D0 60 AD 54 93 D0 6A
9138: 0B 20 DE FF E0 01 90 03 B7
9140: EE 54 93 60 AD 71 93 D0 FA
9148: 17 EE 25 D0 EE 26 D0 EE 19
9150: 27 D0 EE 28 D0 20 DE FF 2F
9158: E0 03 90 03 EE 71 93 60 24
9160: AD 80 93 D0 2F A9 00 8D 59
9168: 26 D0 A9 01 8D 27 D0 8D 1D
9170: 28 D0 AD 17 D0 09 03 8D 98
9178: 17 D0 A9 70 8D F8 47 8D D5
9180: F9 47 A9 45 8D 08 D4 A9 C4
9188: 81 8D 0B D4 A9 00 8D 17 C5
9190: D4 EE 80 93 AD 90 93 C9 04
9198: 08 F0 04 EE 90 93 60 A9 B2
91A0: 00 8D 90 93 AD F8 47 C9 0A
91A8: 77 F0 07 EE F8 47 EE F9 30
91B0: 47 60 A9 80 8D 0B D4 AD 9D
91B8: 15 D0 29 FC 8D 15 D0 EE 27
91C0: 10 94 60 AD 09 94 C9 02 DC
91C8: F0 06 EE 09 94 4C 31 EA B4
91D0: A9 00 8D 09 94 AD 08 94 EF
91D8: D0 15 AD FD 47 C9 7C D0 C8
91E0: 08 A9 7A 8D FD 47 4C 01 2D
91E8: 92 EE FD 47 4C 01 92 AD 3D
91F0: FD 47 C9 7A D0 08 A9 7C 79
91F8: 8D FD 47 4C 01 92 CE FD 78
9200: 47 AD FC 47 C9 7F D0 08 5B
9208: A9 7D 8D FC 47 4C 31 EA 69
9210: EE FC 47 4C 31 EA FF AB
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COMMODARES
PROGRAMMING CHALLENGES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

Commodares, c/o *Ahoy!*
P.O. Box 723
Bethel, CT 06801

We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible, where appropriate. Be sure to tell what makes your solutions unique or interesting, if they are.

Programs on diskette (1541 format only) are welcome, but they must be accompanied by listings. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares*!

PROBLEM #32-1: DILIGENT DECODER

Several readers complained that the promised decoder follow-up to Jim Speers' *Problem #28-4: Elegant Encoder* did not appear in the May issue. Well, complain no more. Write a program that decodes a word which has been encoded according to *Problem #28-4.* Refer to the discussion of the encoding process below or look back at the April issue of *Ahoy!*

PROBLEM #32-2: TEXT SEARCH

Len Lindsay (Madison, WI) suggested this challenge. Write a short program which reads a text file from disk and prints only those lines containing a specified "search string."

To get started, run this program to create a simple sequential text file on disk called "TESTFILE":

```
10 OPEN 8,8,8,"TESTFILE,S,W"
20 FOR N=1 TO 4
30 READ L$ : PRINT#8,L$
40 NEXT N : CLOSE 8 : END
50 DATA FIRST LINE, SECOND LINE
60 DATA THIRD LINE, FOURTH LINE
```

If the user specifies "IR" as the search string, your program reads "TESTFILE" and prints

```
FIRST LINE
THIRD LINE
```

since only those two lines contain the string "IR".

Is it possible to use your program to search through a program file to find lines containing specified keywords or variables?

PROBLEM #32-3: ROUND ROBIN

Here's a good one from William Arett (Talkeetna, AK). Write a simple program to generate a round robin sports match. The user specifies the number of teams. Each team must play every other team. All teams play in every round.

For example, if there are six teams, in Round I the teams competing might be 1 and 4, 2 and 5, 3 and 6. In Round II, 1 and 5, 2 and 6, 3 and 4 could compete, and so forth. If there are N teams, there will be N-1 rounds. Your program should print the round number and the pairs of competing teams in each round.

If you need more of a challenge, set up a schedule so that each team plays one game at home and the next game away as much as possible.

PROBLEM #32-4: CENTIPEDE SCROLLER

The word "CENTIPEDE" begins at the upper left corner of the screen and moves horizontally to the right. As its letters reach the right side of the screen, they drop down to the next line and start moving to the left. After the "C" drops down, the screen shows "EDEPITNEC" moving to the left on the second line. When this word reaches the left side of the screen, once again it "centipedes" down to the next line and moves right.

The process continues to the bottom of the screen. As the letters move off the screen at the right edge of the bottom line, they reappear at the top left corner of the screen, and the entire sequence is repeated.

The effect may be more impressive if your program is able to limit the width of the "screen" to fewer than 40 characters.

This month we will look at readers' solutions to *Commodares* from the April 1986 issue of *Ahoy! Problem #28-1: Print Formatter* from Francisco Vellejo (Bayamon,

PR) and Robert Croswell (Trappe, MD) brought many solutions, including some general purpose routines. The problem is to be able to round off and format an amount of money so that there are always two decimal places displayed when the amount is printed.

The solution from James Killman (Memphis, TN) is shown in lines 20 and 30 below.

```
1 REM COMMODARES PROBLEM #28-1:
2 REM      PRINT FORMATTER
3 REM SOLUTION BY
4 REM   JAMES KILLMAN
5 REM
10 INPUT V : IF V=0 THEN END
20 G$=STR$(INT(V)):X=LEN(G$)
30 F$=STR$(V+.005):PRINT LEFT$(F$,X+3)
40 GOTO 10
```

The key to all solutions is to convert the numeric quantity into a string variable and then manipulate it. Line 20 determines the number of digits in the input value to the left of the decimal point. Line 30 adds .005 to the input value before converting it to a string. The LEFT$ statement truncates the result which is properly rounded because of the added .005. The number of digits to the left of the decimal plus three additional characters (the decimal point and two decimal digits) are then printed.

The program from Jim Speers (Niles, MI) is a more general solution. The input value and the number of decimal places to be rounded are given in V and L.

```
1 REM COMMODARES PROBLEM #28-1:
2 REM      PRINT FORMATTER
3 REM SOLUTION BY
4 REM      JIM SPEERS
5 REM
10 INPUT"VALUE, NUMBER OF DECIMAL PLACES
";V,L
15 V$=STR$(INT(V*10^L+.5))
20 PRINT TAB(32-LEN(V$)+L) LEFT$(V$,LEN(
V$)-L) "." RIGHT$(V$,L)
```

Line 15 gives a properly rounded string-equivalent of the input value. Line 20 prints three separate pieces of the result: the integer part, the decimal point, and the decimal part. The TAB statement allows all values to be printed in a column with their decimal points aligned in column 32. Change the 32 in line 20 to put the column somewhere else.

You may create your own ticker tape display with the solution to *Problem #28-2: Simple Scroller* from A.J. Reid (Feasterville, PA). The problem was to continuously scroll a message from right to left across the screen. A couple of modifications to Mr. Reid's program are included in the listing below.

```
1 REM COMMODARES PROBLEM #28-2:
2 REM      SIMPLE SCROLLER
3 REM SOLUTION BY
4 REM     A.J.REID
5 REM
10 W=40 :FOR N=1 TO W/2 :S$=S$+" .":NEXT
15 INPUT M$ : M$=S$+M$+S$
20 FOR N=1 TO LEN(M$)-W:PRINT CHR$(145)M
ID$(M$,N,W);
30 FOR J=1 TO 50:NEXT:NEXT:GOTO 20
```

The value of W in line 10 may be changed to correspond to the width of your screen. The " ." characters comprising S$ may be replaced by two spaces or any other pair of characters. The CHR$(145) is the cursor-up character. Line 30 is a time delay which may be adjusted as desired.

If the input string will be 80 characters or more, on the C-64 you might use the following statements to replace the INPUT statement in line 15:

```
15 POKE 198,0 : WAIT 198,1 : GET K$ :
   IF K$<>CHR$(13) THEN M$=M$+K$ : PRINT
   K$; : GOTO 15
16 M$=S$ + M$ + S$
```

Jim Speers uses POKE 631,34 : POKE 198,1 : INPUT M$ to be able to enter commas and colons into M$. The value 34 POKEd into the keyboard buffer is a quotation mark, so the C-64 thinks it is in quote mode. On the C-128, the POKE, WAIT, and GET statements in line 15 above can all be replaced by the GETKEY K$ statement.

Try a value of W different from your actual screen width for some unusual effects. In particular try half of the screen width for a double display.

Another first-rate math puzzle submitted by Ted Grondski (Springfield, MA) brought out the "number theorist" in quite a few readers. *Problem #28-3: Math Mystery* requested a list of all seven-digit numbers which a) are divisible by eleven, b) contain no 0's, and c) have no two digits alike.

The most straightforward approach was to let the computer look at the numbers from 1,234,567 through 9,876,543 and select those which exhibited all three properties. The program from Scott Sprouse (Ninety-Six, SC) steps through the numbers, testing first for divisibility by 11 in line 20. Then the numbers containing the digit 0 are eliminated by lines 30 to 40. Finally all numbers containing duplicated digits are skipped by lines 45 through 65.

```
1 REM COMMODARES PROBLEM #28-3:
2 REM       MATH MYSTERY
3 REM SOLUTION BY
4 REM       SCOTT SPROUSE
5 REM
10 FOR X=1234567 TO 9999999
15 : TT=X/11
20 : IF TT<>INT(TT) THEN 75
25 : X$=STR$(X)
30 : FOR I=3 TO 8
35 :   IF MID$(X$,I,1)="0" THEN 75
```

```
40 : NEXT I
45 : FOR I=2 TO 7
50 :    FOR J=I+1 TO 8
55 :       IF MID$(X$,I,1)=MID$(X$,J,1) TH
EN 75
60 :    NEXT J
65 : NEXT I
70 : PRINT X
75 NEXT X
80 END
```

Any numbers left over are solutions to the problem and are printed by line 70. As you may surmise, this program takes a long (l-o-n-g!) time to execute. Estimates from readers with similar programs were as much as 34 hours for all solutions to be found.

There were various ways of reducing the execution time. The most frequently used method was to find the first solution (1,234,596) and to STEP by 11 through the remaining numbers, culling those with 0's or duplicated digits. That eliminates the need to perform the divisibility check on each number. Still, the analysis of nearly 800,000 remaining seven-digit numbers is very time-consuming.

That brings us to the "fancy solutions," those for which biological brain power reduces the amount of silicon brain power required. The program from Ron Jordan (Florence, OR) is one of several very nice examples.

```
1 REM COMMODARES PROBLEM #28-3:
2 REM        MATH MYSTERY
3 REM SOLUTION BY
4 REM        RON JORDAN
5 REM
10 A=1 : N=7 : DIM C(N-1)
20 FOR J=A TO 8:P$=MID$(STR$(A),2)+MID$(
STR$(J+1),2)
30 FOR K=1TO9:R$=RIGHT$(STR$(K),1):IF R$
=LEFT$(P$,1) OR R$=RIGHT$(P$,1) THEN 50
40 S$=S$+R$
50 NEXT K
60 I=N-1 : V=VAL(S$):IF V/11=INT(V/11) T
HEN PRINT S$,:CT=CT+1
70 S$=LEFT$(S$,I-1)+RIGHT$(S$,N-I)+MID$(
S$,I,1)
80 C(I)=C(I)+1:IF C(I)<=N-I THEN 60
90 C(I)=0:IF I>1 THEN I=I-1:GOTO 70
100 PRINT "COUNT =" CT:S$=""
110 NEXT J:A=A+1:IF A<9 THEN 20
```

Ron explains that there are 9×8×7×6×5×4×3 = 181,440 arrangements of seven-digit numbers containing no 0's and no duplicated digits. Ron's program excludes every combination of two digits from the possible nine digits with the J loop starting at line 20. There are 36 unique pairs of two digits each. The K loop determines the 36 groups of seven unique digits.

Once a seven-digit number is created, lines 60 through 90 generate all permutations of those digits. Ron credits Allan Flippin's *Printing Permutations* solution to *Problem #24-1* for lines 60 through 90. It turns out that there are 17,280 numbers which meet all three criteria of the problem. Ron's program takes about two hours fifteen minutes on the C-128 in FAST mode. Jim Speers sent a similar solution.

A lengthier program was sent by Matt Shapiro (Fort Lee, NJ), but he says it prints all 17,280 solutions in less than three quarters of an hour. Matt used the fact that a seven-digit number is divisible by eleven if and only if the difference between the sum of its 1st, 3rd, 5th, and 7th digits and the sum of its 2nd, 4th, and 6th digits is divisible by 11. Can you use this divisibility rule to create a solution to the problem? If you are interested in Matt's solution, please send a self-addressed stamped envelope with your request clearly stated to me at *Commodares.*

Wallace Leeker (Lemay, MO) sent an interesting method of testing for divisibility of a seven digit number by eleven. He used the following statements:

```
Y$ = STR$(X/11) :
IF MID$(Y$,8,1)="." THEN ... (X is not
divisible by eleven.)
```

If there is a decimal point at position 8, then X divided by eleven is not an integer!

Problem #28-4: Elegant Encoder from Jim Speers (Niles, MI) was more difficult to describe than to implement. Each letter in a word is to be encoded by replacing it with a letter whose numeric value equals the sum (modulo 29) of the other letters' values in the word. 29 characters were allowed (@, A-Z, [, and £) with numeric values 0 through 28 respectively. X modulo 29 (X MOD 29) means to continuously subtract 29's from X until the result is less than 29.

Jacqueline Callaway (Orange Beach, AL) called this subroutine to find Y MOD 29:

```
100 Y=Y-29 : IF Y<29 THEN RETURN
110 GOTO 100
```

The program below from Frank T. Smith (Wilmington, DE) calculates T MOD 29 within the parentheses in line 90.

```
1 REM COMMODARES PROBLEM #28-4:
2 REM      ELEGANT ENCODER
3 REM SOLUTION BY
4 REM      FRANK T. SMITH
5 REM
10 DIM M(25)
20 PRINT"INPUT WORD TO BE ENCODED"
30 GET I$:IF I$="" THEN 30
40 IF I$=CHR$(13) THEN 70
50 IF I$<"@" OR I$>"+" THEN 30
60 PRINT I$; : N=N+1 : M(N)=ASC(I$)-64 :
GOTO 30
70 FOR A=1 TO N:FOR B=1 TO N:IF A<>B THE
```

```
N T=T+M(B)
80 NEXT B
90 C$=C$+CHR$(T-INT(T/29)*29+64) : T=0 :
NEXT A
100 PRINT:PRINT"CODED WORD IS ";C$:PRINT
:PRINT:N=0:C$="":GOTO 20
```

Line 70 of Frank's program adds the values of all letters except for the one being encoded. The value 64 in lines 60 and 90 converts the ASCII values of the allowed characters (64 through 92) to the specified values (0 through 28).

Paul Claessen (Las Cruces, NM) sent this COMAL solution.

```
1 //  COMMODARES PROBLEM #28-4:
2 //        ELEGANT ENCODER
3 //  SOLUTION BY
4 //        PAUL CLAESSEN
5 //    >> COMAL SOLUTION <<
10 INPUT A$
20 V:=0
30 FOR I:=1 TO LEN(A$) OPEN
40    V:=V-(ORD(A$(I:I))-64)
50 ENDFOR I
60 FOR I:=1 TO LEN(A$) OPEN
70    TV:=V-(ORD(A$(I:I))-64)
80    TV:=TV MOD 29
90    PRINT CHR$(TV+64),
100 ENDFOR I
```

Paul's program uses the built-in MOD function of COMAL. The ORD function is equivalent to the BASIC ASC function. Several readers took the approach of subtracting each letter's value in turn from the sum of all the letters in the word, rather than to add the letters each time. Line 70 of Paul's program performs this function.

Jim Speers mentioned that the encoded form of "tax" is appropriate. Give it a try. Ron Jordan pointed out that one-letter words are "nulled" by this encoding process, and that the letters are merely reversed for two-letter words. He suggests bracketing the one- and two-letter words with the non-alphabetic symbols: "I" is written as "[I@" for example. Solutions from Matt Shapiro and David Hoffner (Brooklyn, NY) included the encoder and the decoder. We'll see their solutions when we discuss *Problem #32-1.*

Congratulations to the following people (in alphabetical order) not already mentioned this month:

Sharon Albers (Kiester, MN)
Robert Bailey (Rockford, IL)
Phil Beatty (Moncton, NB)
Jim Borden (Carlisle, PA)
Mark Breault (Brandon, MAN)
Leo Brenneman (Erie, PA)
Dave Budgett (Graceville, MN)
Larry Byrd (Port St. Joe, FL)
Eddie Byrd (White Oak, MO)
Paul Conant (Richardson, TX)
Marcus Cooper, Jr. (Honolulu, HI)
Oren Dalton (El Paso, TX)
Veli-Matti Eerola (Kerava, Finland)
Roy Gaber (Medford, NY)
Arthur Grant (Mahone Bay, NS)
Ken Karow (Chicago, IL)
Alan Leish (Los Angeles, CA)
Bob Light (Richmond, VA)
Rob Lindsay (Dallas, TX)
John Livdahl (Lake Park, MN)
Paul Mather (Warminster, ONT)
Darrell Mohl (Pasco, WA)
Dale Moose (Plattsburgh, NY)
Daniel O'Grady (Milwaukee, WI)
Bill Okerblom (Providence, RI)
Peter Owen (Hamilton, ONT)
Steve Parker (Gray, TN)
Jaime Ramierez (Monterey, MX)
Jeff Stearns (Alamagordo, NM)
Steven Steckler (Columbia, MD)
Charles Terry (Great Falls, MT)
Thomas Teske (Niles, MI)
Gene Toles (Cincinnati, OH)
Peter Troy (Casco, ME)
W.W. Varnedoe, Jr. (Huntsville, AL)
George Wade (Holly, MI)
Timothy Williams (Henderson, KY)
Todd Wostrel (Lincoln, NE)

Here are several suggestions from readers for problems that are "beyond the scope" of *Commodares.* You might enjoy working on these in your spare time. Paul Conant (Richardson, TX) suggests writing a machine language routine which expands the C-64 keyboard buffer to 256 or more bytes yet is still transparent to BASIC programs. Richie France (Chattanooga, TN) wants a machine language program, loadable and activated from BASIC, which prevents the cursor from leaving the existing screen (i.e. prevents scrolling).

Paul Mather (Warminster, ONT) has written a program allowing the user to talk to the computer through the paddle port using a light signal and a light sensitive resistor. He wants the computer to be able to talk back by means of the SID chip. Anyone know how to make SID talk?

Chris MacKenna (Las Vegas, NV) wants to connect a C-64 to a small musical keyboard instrument such as the Casio PT-80. If you have worked on such a project, you might let us know.

Finally, Alan Leish (Los Angeles, CA) sent a program he wrote based upon an article in the January 1986 issue of *Scientific American.* The program is a three-dimensional simulation of stars in motion. If you enjoyed *Comet Catcher* in the April 1986 *Rupert Report,* you might try your hand at the program described in *Scientific American.* (Use the "half-increment" approach described in the *Rupert Report* to obtain more accurate results.) You'll find that the Computer Recreations section in that magazine provides some serious challenges for the reasonably advanced programmer. There's no excuse for running out of things to do with your computer! □

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CADET'S COLUMN

MOVING UP FROM BASIC TO PASCAL

By Cheryl Peterson

I'm sure those of you who read this column regularly have noticed that several have dealt with structured programming. Though my preoccupation with structuring may have seemed a bit strange, these next few months will reveal why it's important to learn how to organize your programming efforts. We'll be dealing with languages other than BASIC, and those of you who have taken to heart the things I've said about structured programming will find it easier to accept the cramped style needed.

While programming in BASIC can be just as effective using haphazard methods as using the structured approach, when you move on to another programming language this is rarely true. Almost all other languages require a much more structured approach if your programs are to work at all.

PASCAL BACKGROUND

To understand why Pascal has such rigid rules for program structure, it helps to know that it was written by a university professor, Niklaus Wirth, whose purpose was to teach students structured programming practices.

Originally written back in the early '70s for a larger computer in use at the university, it has since been implemented on many other computers and has gradually worked its way through the microcomputer realm. There are several implementations available for the Commodore 64, some of which I'll discuss later (see *Pascal Vendors* box on page 81).

PROGRAM STRUCTURE

How structured can a language get? The diagram at top right shows the proper structure of a Pascal program, followed by the structure frequently used for a BASIC program. Notice the differences between the optional items in BASIC and the mandatory items in Pascal. Mandatory items are printed in ALL CAPS.

A Pascal program must be prefaced with the program name and a header that identifies input and/or output channels to be used. These channels can identify disk or printer files. This is always followed by a list of variables, although constants, labels, and user-defined data types may precede the VAR declaration. Structured programmers won't find it difficult to adjust to one of Pascal's most rigid rules: all global variables must be declared early in the program.

Pascal Program Structure

```
PROGRAM NAME (HEADING)
label declarations
constant definitions
type definitions
VAR declarations
Procedure declarations
Function declarations
BEGIN
    Begin
    End
END
```

BASIC Program Structure

```
Program Name
Variables
PROGRAM BODY
End
Subroutines
```

The main body of the program is defined by BEGIN and END statements. Subroutines (or the procedures that Pascal uses in their place) are also delimited by BEGIN and END statements. While BASIC's subroutines are found at the end of structured programs, Pascal's procedures are all defined at the beginning of the program and then referenced from the body of the program.

A similarity between the two is the handling of functions. Most structured BASIC programmers define their functions at the beginning of a program. So it is with Pascal. Functions and labels are defined at the beginning of the program, if they are used. You don't need to use all these items to write a program, as you will see in our sample program.

PROCEDURES

Another difference is the location of subroutines. In BASIC, a group of commands that is repeated to perform one task of the program is called a subroutine. The subroutines that perform most of the program's actual work are generally found at the end of a BASIC program. These subroutines are called by GOSUB commands in the program's main body. They redirect the flow to a certain line number. When the subroutine is finished, program execution is usually returned to the main program via a RETURN statement.

In Pascal, subroutines are called procedures and they are placed at the beginning of the program. Each procedure is given a name and when the main body of the program needs to access the procedure, it is called by name. By artfully choosing the procedure names, you can make a Pascal program seem almost like English.

SELF-ADDRESSED LABELS *(Pascal Version)*

```
type labeldata =
   record
     name: packed array[1..20] of char;
     street: packed array[1..40] of char;
     city: packed array[1..20] of char;
     st: packed array[1..2] of char;
     zip: packed array[1..9] of char;
   end;

   var
   labels: file of labeldata;
   address: labeldata;
   lines, passes, counter, total: integer;

procedure labelformat;
  begin
    writeln( "How many lines on each label?" );
    readln(total);
        if total < 3 then labelformat;
  end;

procedure printnumber;
  begin
    writeln( "How many labels to print?");
    readln(passes);
  end;

procedure readdata;
  begin
    writeln( "Enter full name--20 characters or less" );
    readln(address.name);
    writeln( "Enter address--40 characters or less" );
    readln(address.street);
    writeln( "Enter city name--20 characters or less");
    readln(address.city);
    writeln( "Enter two character state code" );
    readln(address.st);
    writeln( "Enter postal or zip code--9 characters or less." );
    readln(address.zip);
  end;

procedure print;
  begin
    counter :=1;
    rewrite(output, 'dev4');
      while counter <= passes do
        begin
          writeln;
          writeln(address.name);
          writeln(address.street);
          writeln(address.city," ",address.st," ",address.zip);
          lines :=total;
          lines :=lines-4;
            repeat
              lines :=lines-1;
              writeln;
          until lines=0;
        counter :=counter + 1;
      end;
   rewrite(output, 'dev3');
end;

begin
   labelformat;
   printnumber;
   readdata;
   print;
end.
```

As you can see from this, Pascal is very modular. Labels and constants are defined first. There's also a type definition that can be used at the beginning. Then all the variables used are listed. Any special functions that need to be performed are defined next. Then the different procedures are defined. Finally, the main program references these definitions as they are needed.

Functions and procedures can be mixed together in the definition section of programs. For instance, you can have a procedure, followed by a function, followed by a couple of procedures, with a function at the end. Keeping them in the order in which they are used isn't a bad idea. It makes it easier to find problems when debugging.

To get some idea of the differences between these programming devices, let's try to make a few generalizations. Variables are generally used to store incoming information. Functions are usually mathematical adjustments made to the incoming or outgoing data. Labels are used to redefine the input in some way, usually by giving something a more convenient name.

Procedures take information in, storing it and/or putting it back out in usable form. Procedures are like little programs within the program. They start with a BEGIN statement and end with an END; statement. A procedure may contain all the other elements: variables, labels, constants, and functions. In fact, procedures can even contain other procedures.

Functions can also contain all the other elements. But functions can be called in the middle of a line, whereas procedures are called using entire lines. Or as my husband says, "You evaluate a function and execute a procedure."

SYNTAX NOTES

Generally in Pascal, each statement ends with a semicolon (;). A few of the reserved words do not need punctuation. For instance, BEGIN, VAR, WHILE, FOR, and DO don't take any punctuation. ENDs require a semicolon, except for the last END, which usually takes a period (.).

RENAMING

At this point, most of you are familiar

with the simplest BASIC commands: GET, INPUT, and PRINT. With these, information can be taken from the keyboard and placed on the screen or sent to the printer. Pascal has two commands that perform basically the same functions: READ and WRITE or READLN and WRITELN.

GET and READ both take information from the keyboard and store it in specified variables. READLN works similarly to the INPUT statement, reading the information only after a RETURN is pressed. This makes it easier to allow for formatted input.

WRITE and WRITELN put the information up on the screen or send it over to the printer. WRITELN is used to shift the output to a new line. With WRITE all the information is strung out on the same line. There is a difference with using the WRITE statement, however. With BASIC, any text to be output to the screen is surrounded by double quotes: "Print this." With Pascal, the information is contained between single quotes surrounded by parentheses: ('Print this.') In some Commodore Pascals, the single quotes have been changed to double quotes, since many Commodore programmers are already accustomed to using them.

COMMAND SIMILARITIES

Pascal has many of the same statements that BASIC does, but (as we've already seen) they hide behind different names. For instance, FOR/NEXT; in Pascal, it's FOR/TO/DO. Then there's IF/THEN. These work in much the same way as their BASIC counterparts.

Pascal adds a lot of flexibility to these commands, though. ELSE is added to the IF/THEN command and you also use NOT in place of < >. Pascal also has extended commands like WHILE/DO, CASE/OF, and REPEAT/UNTIL.

SAMPLE PROGRAMS

To get a better idea of how a Pascal program works, we're going to compare two programs that perform the same function; one written in BASIC, the other in Pascal. First off, let's see what the programs do.

Anyone who sits down at the desk to pay the monthly bills knows what a pain it is to put return addresses on each letter. Some folks buy preprinted address labels to stick on their letters. Being the lazy type, I bought them. But I recently moved, and it takes 6 to 8 weeks to get new labels. So, how about a program to print return addresses on tractor-feed labels?

This same chore can be done by most any database program, but DB programs usually take a long time to load. And then you have to enter in all the information on how to format the report to get labels positioned right, etc. Our programs take care of this almost painlessly.

Let's take a look at the basic process first. I've used a fairly structured style in the BASIC version (page 106) to give a more accurate comparison between the two languages. The opening routine of the BASIC version just identifies the program. The routine at 200 is the main program. Before accessing the first subroutine, it initializes the two variables LINES and PASSES. Of course, in BASIC this is not strictly necessary, but I wanted to maintain the parallels.

We'll need several subroutines. Let's call them by names so it will be easy to compare them. We need to know how many lines will be printed on each label since labels come in several different sizes. Usually labels have at least six but not more than eighteen lines apiece. Since there are three lines to be printed, we need to be sure that the number entered is three or more. This routine is called LABELFORMAT.

For convenience' sake, the program assumes a three-

PASCAL VENDORS

Super Pascal
Abacus Software
P.O. Box 7211
Grand Rapids, MI 45910
Phone: 616-241-5510

Kyan Pascal
1850 Union St. #183
San Francisco, CA 94123
Phone: 415-775-2923

Oxford Pascal
Limbic Systems Inc.
1056 Elwell Court
Palo Alto, CA 94303
Phone: 415-424-0168

WATCOM Pascal
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Bellmawr, NJ 08031



Reader Service No. 180

line return address with one line to skip over the perforation between labels. If you wish to make adjustments to the programs, you can add more variables and lines at will. You'll need to change the number of lines (four) that are subtracted from the LINES variable.

Another routine is needed for entering in the return address data. This one is called READDATA. In order to make the program universally appealing, it contains input statements that allow the user to change the address each time the program is used. If you want to avoid having to reenter the data each time, assign values to the NAMES$, ADDRESS$, CITY$, ST$, and ZIP$ variables in the subroutine at 500 in the BASIC version.

For instance, you might change the BASIC subroutine to read similar to this:

```
500 REM READDATA
510 NAME$="JOHN HENRY COMMODORE"
520 ADDRESS$="12345 LOONY LANE"
530 CITY$="HOWARDSVILLE"
540 ST$="NY"
550 ZIP$="10000"
560 RETURN
```

To adjust the Pascal version, changes would need to be made in the procedure called readdata. You would have to use equate statements to set the values of the elements of the record labeldata. Thus:

```
Procedure Readdata;

Begin
    (address.name)   := ("JOHN HENRY COMMODORE");
    (address.street) := ("12345 LOONY LANE");
    (address.city)   := ("HOWARDSVILLE");
    (address.st)     := ("NY");
    (address.zip)    := ("10000");
End;
```

This is one major difference between using BASIC and Pascal. Pascal has tools built in to handle larger blocks of information. While Pascal has arrays and variables just as BASIC does, it also has records, sets, and files. These allow you to manipulate data in larger chunks.

In our Pascal program, we start by defining a record to contain our labeldata. Before we can define the elements in the record, we must define the data type labeldata as being a record. We then define the elements of the record.

We must then define our variables. One of these defines address as the record for our labeldata. The four definitions specified as integers are used to track data for the print routine.

The variable definition "labels: file of labeldata" is a dummy variable. I put it in as a hint for those who would like to try to expand the program. With this variable and a little programming, you could take in data for more than one record and write it to disk. By creating a file of records on disk, you could use the program to write labels for mailing addresses. With this expansion you could use the program to track your Christmas card list or all your club members who need to receive the newsletter each month. For those who care to make the attempt, I'd be interested in seeing your results.

If you take a look at the main body of the Pascal program, which is actually located at the end of the program, you'll see that it only has four procedures. We've discussed the readdata procedure already. The labelformat procedure determines how many lines for each label. The printnumber procedure handles how many repetitions are needed and the print procedure prints the labels.

We need to take a closer look at the print procedure, because this is one area where inconsistency can be found. Each version of Pascal can handle addressing the printer in a different way. This program was written using the WATCOM Pascal compiler because it was easiest to use of those I had available. Other Pascals may need a different command to address device 4, so check your version of Pascal for any adjustments that need to be made.

There is another interesting note to make about the print routine. Although you should define variables at the beginning of the program, there is an exception to this rule. If a variable is used only within one subroutine, you can define the variable at the beginning of the subroutine instead of at the beginning of the program. The variables counter and total could have been declared at the beginning of this routine because they are only used in this one section of the program.

These local variables and the information stored in them can only be used within their declaring routine. When you exit the routine, the variable is forgotten. Local variables cannot be used to transfer information from one routine to another. For that you must use the global variables declared in the initial VAR section.

That's about it. As you can see, the basic ideas of the programs are the same. The syntax and actual orientation of the processes is a bit different. But jumping to a new language isn't quite as difficult as learning your first programming language.

Next month we'll take a look at another language and see how it compares to BASIC. Till then, hope to see you on PlayNET. ☐

SEE PROGRAM LISTING ON PAGE 106

PROGRAMS WANTED

Ahoy! is always looking for the best utility, productivity, and game programs written by Commodore users. Send your best work on disk, accompanied by a hard copy, an introductory article, and a self-addressed return envelope with sufficient return postage affixed, to:

Ahoy! Program Submission Department
Ion International Inc.
45 West 34th Street—Suite 407
New York, NY 10001

Payment is made upon acceptance.

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listing guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart . The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See the instructions preceding each program.)

Also on the following page you will find *Flankspeed*, our ML entry program, and instructions on its use. ☐

Call *Ahoy!* at 212-239-0855 with any problems.

When You See	It Means	You Type	You Will See
[CLEAR]	Screen Clear	SHIFT CLR/HOME	
[HOME]	Home	CLR/HOME	
[UP]	Cursor Up	SHIFT ↑CRSR↓	
[DOWN]	Cursor Down	↑CRSR↓	
[LEFT]	Cursor Left	SHIFT ←CRSR→	
[RIGHT]	Cursor Right	←CRSR→	
[SS]	Shifted Space	SHIFT Space	
[INSERT]	Insert	SHIFT INST/DEL	
[DEL]	Delete	INST/DEL	
[RVSON]	Reverse On	CNTRL 9	
[RVSOFF]	Reverse Off	CNTRL 0	
[UPARROW]	Up Arrow	↑	
[BACKARROW]	Back Arrow	←	
[PI]	PI	π	
[EP]	English Pound	£	

When You See	It Means	You Type	You Will See
[BLACK]	Black	CNTRL 1	
[WHITE]	White	CNTRL 2	
[RED]	Red	CNTRL 3	
[CYAN]	Cyan	CNTRL 4	
[PURPLE]	Purple	CNTRL 5	
[GREEN]	Green	CNTRL 6	
[BLUE]	Blue	CNTRL 7	
[YELLOW]	Yellow	CNTRL 8	
[F1]	Function 1	F1	
[F2]	Function 2	SHIFT F1	
[F3]	Function 3	F3	
[F4]	Function 4	SHIFT F3	
[F5]	Function 5	F5	
[F6]	Function 6	SHIFT F5	
[F7]	Function 7	F7	
[F8]	Function 8	SHIFT F7	

BUG REPELLENT By MICHAEL KLEINERT and DAVID BARRON

Bug Repellent is a checksum program used for proofreading BASIC listings typed in from *Ahoy!* magazine. For each program line you enter, *Bug Repellent* will produce a two-letter code that should match the code listed beside that line in the magazine.

Type in, save, and run the *Bug Repellent.* (If you have a C-64, type in the C-64 version. If you have a C-128, you will need to type in the C-64 version for use with C-64 programs, and the C-128 version for use with C-128 programs.) If you have typed in *Bug Repellent* properly, you will get the message BUG REPELLENT INSTALLED; otherwise you will get an error message. If you get an error message, double check the *Bug Repellent* program for typing mistakes. Type NEW and hit RETURN. Then type in and save, or load, the *Ahoy!* program you wish to check. Type in SYS 49152 for the C-64 version or SYS 3072 for the C-128 version and hit RETURN (this will begin execution of *Bug Repellent*). You will see the prompt SCREEN OR PRINTER ? Hit S if you want the codes listed on the screen, or P if you want them listed on the printer. To pause the listing depress and hold the SHIFT key.

Compare the codes your machine generates to those listed to the right of the corresponding program lines. If you spot a difference, that line contains an error. Write down the numbers of the lines where the contradictions occur. LIST each line, locate the errors, and correct them.

COMMODORE 64 VERSION

```
·100 FOR X = 49152 TO 49488:READY:S=S+Y          AB
·110 IF Y<0 OR Y>255 THEN 130                    EA
·120 POKE X,Y:NEXT:GOTO140                       ID
·130 PRINT"[CLEAR][DOWN]**ERROR**":PRINT"[DOWN
 ]PLEASE CHECK LINE"PEEK(64)*256+PEEK(63):END    ID
·140 IF S<>44677 THEN PRINT"[CLEAR][DOWN]**ERR
 OR**":PRINT"[DOWN]PLEASE CHECK DATA LINES 170
 -500":END                                       HJ
·150 PRINT"[CLEAR]":POKE53280,0:POKE53281,6:PO
 KE646,1                                         NP
·160 PRINT"[RVSON][6" "]C-64 BUG REPELLENT INS
 TALLED[6" "]"                                   LF
·170 DATA32,161,192,165,43,133,251,165,44,133    DL
·180 DATA252,160,0,132,254,32,37,193,234,177     DB
·190 DATA251,208,3,76,138,192,230,251,208,2      OF
·200 DATA230,252,76,43,192,76,73,78,69,32        KN
·210 DATA35,32,0,169,35,160,192,32,30,171        CA
·220 DATA160,0,177,251,170,230,251,208,2,230     CE
·230 DATA252,177,251,32,205,189,169,58,32,210    JE
·240 DATA255,169,0,133,253,230,254,32,37,193     CL
·250 DATA234,165,253,160,0,76,13,193,133,253     NB
·260 DATA177,251,208,237,165,253,41,240,74,74    MB
·270 DATA74,74,24,105,65,32,210,255,165,253      EP
·280 DATA 41,15,24,105,65,32,210,255,169,13      GH
·290 DATA32,220,192,230,63,208,2,230,64,230      AN
·300 DATA251,208,2,230,252,76,11,192,169,153     NG
·310 DATA160,192,32,30,171,166,63,165,64,76      BF
·320 DATA231,192,96,76,73,78,69,83,58,32         EP
·330 DATA0,169,247,160,192,32,30,171,169,3       PJ
·340 DATA133,254,32,228,255,201,83,240,6,201     FK
·350 DATA80,208,245,230,254,32,210,255,169,4     FL
·360 DATA166,254,160,255,32,186,255,169,0,133    CL
·370 DATA63,133,64,133,2,32,189,255,32,192       GC
·380 DATA255,166,254,32,201,255,76,73,193,96     NN
·390 DATA32,210,255,173,141,2,41,1,208,249       NH
·400 DATA96,32,205,189,169,13,32,210,255,32      IM
·410 DATA204,255,169,4,76,195,255,147,83,67      KC
·420 DATA82,69,69,78,32,79,82,32,80,82           DC
·430 DATA 73,78,84,69,82,32,63,32,0,76           ML
·440 DATA44,193,234,177,251,201,32,240,6,138     GN
·450 DATA113,251,69,254,170,138,76,88,192,0      JK
·460 DATA0,0,0,230,251,208,2,230,252,96          NA
·470 DATA170,177,251,201,34,208,6,165,2,73       DM
·480 DATA255,133,2,165,2,208,218,177,251,201     JA
·490 DATA32,208,212,198,254,76,29,193,0,169      FM
·500 DATA13,76,210,255,0,0,0                     PA
```

COMMODORE 128 VERSION

```
·100 FAST:FOR X = 3072 TO 3520:READ Y:POKE X,Y
 :S=S+Y:TRAP110:NEXT:SLOW                        IH
·110 SLOW:IF S<>49057 THEN PRINT"[CLEAR][DOWN]
 **ERROR**":PRINT"[DOWN]PLEASE CHECK DATA LINE
 S 140-390":END                                  JA
·120 PRINT"[CLEAR][DOWN]  C-128 BUG REPELLENT
 INSTALLED"                                      II
·130 PRINT"[4" "]TYPE SYS 3072 TO ACTIVATE"      IN
·140 DATA 32,161,12,165,45,133,251,165,46,133,
 252,160,0,132,254,32,37                         OF
·150 DATA 13,234,177,251,208,3,76,138,12,230,2
 51,208,2,230,252,76,43                          NC
·160 DATA 12,76,73,78,69,32,35,32,0,169,35,160
 ,12,32,80,13,160,0,177                          OL
·170 DATA 251,170,230,251,208,2,230,252,177,25
 1,32,89,13,169,58,32,98                         EF
·180 DATA 13,169,0,133,253,230,254,32,37,13,23
 4,165,253,160,0,76,13                           JO
·190 DATA 13,133,253,177,251,208,237,165,253,4
 1,240,74,74,74,74,24                            LC
·200 DATA 105,65,32,98,13,165,253,41,15,24,105
 ,65,32,98,13,169,13,32                          DE
·210 DATA 220,12,230,65,208,2,230,66,230,251,2
 08,2,230,252,76,11,12                           GM
·220 DATA 169,153,160,12,32,80,13,166,65,165,6
 6,76,231,12,96,76,73,78                         CP
·230 DATA 69,83,58,32,0,169,247,160,12,32,80,1
 3,169,3,133,254,32,107                          HC
·240 DATA 13,201,83,240,6,201,80,208,245,230,2
 54,32,98,13,169,4,166                           GK
·250 DATA 254,160,255,32,116,13,169,0,133,65,1
 33,66,133,250,32,125,13                         LB
·260 DATA 32,134,13,166,254,32,143,13,76,73,13
 ,96,32,98,13,165,211                            JF
·270 DATA 234,41,1,208,249,96,32,89,13,169,13,
 32,98,13,32,152,13,169,4                        GD
·280 DATA 76,161,13,147,83,67,82,69,69,78,32,7
 9,82,32,80,82,73,78,84,69                       PL
·290 DATA 82,32,63,32,0,76,44,13,234,177,251,2
 01,32,240,6,138,113,251,69                      OK
·300 DATA 254,170,138,76,88,12,0,0,0,0,230,251
 ,208,2,230,252,96,170,177                       FJ
·310 DATA 251,201,34,208,6,165,250,73,255,133,
 250,165,250,208,218,177                         GA
·320 DATA 251,201,32,208,212,198,254,76,29,13,
 0,169,13,76,98,13,0,0,32                        FI
·330 DATA 170,13,32,226,85,76,180,13,32,170,13
 ,32,50,142,76,180,13,32                         OF
·340 DATA 170,13,32,210,255,76,180,13,32,170,1
 3,32,228,255,76,180,13,32                       AK
·350 DATA 170,13,32,186,255,76,180,13,32,170,1
 3,32,189,255                                    BP
·360 DATA 76,180,13,32,170,13,32,192,255,76,18
 0,13,32,170,13                                  FP
·370 DATA 32,201,255,76,180,13,32,170,13,32,20
 4,255,76,180,13,32,170                          ID
·380 DATA 13,32,195,255,76,180,13,133,67,169,0
 ,141,0,255,165,67,96                            BJ
·390 DATA 133,67,169,0,141,1,255,165,67,96,0,0
 ,0                                              IF
```

FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1 – SAVEs what you have entered so far.

f3 – LOADs in a program worked on previously.

f5 – To continue on a line you stopped on after LOADing in the previous saved work.

f7 – Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. f7 temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                                LL
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";      ED
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
]"                                                            MC
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"         DM
·120 PRINT"[RVSON][3" "]COPR. 1984, ION INTERNATIONAL INC.
[3" "]"                                                       DH
·125 FORA=54272TO54296:POKEA,0:NEXT                           IM
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
KE54296,15                                                    NH
·135 FORA=680TO699:READB:POKEA,B:NEXT                         KO
·140 DATA169,251,166,253,164,254,32,216,255,96                HJ
·145 DATA169,0,166,251,164,252,32,213,255,96                  JB
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B          KA
·155 GOSUB480:IFB=0THEN150                                    GN
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16                KE
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B                 LO
·170 GOSUB470:IFB=0THEN150                                    EE
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                    MN
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                   GE
·185 POKE253,B:PRINT                                          HN
·190 REM  GET HEX LINE                                        IL
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8                 NH
·200 FORB=0TO1:GOTO250                                        MP
·205 NEXTB                                                    ME
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                    LE
·215 PRINT" [c P][LEFT]";                                     IK
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                    PD
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                   LK
·230 NEXT                                                     IA
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                           LE
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195            BI
·245 REM    GET HEX INPUT                                     AB
·250 GETA$:IFA$=""THEN250                                     HK
·255 IFA$=CHR$(20)THEN305                                     HF
·260 IFA$=CHR$(133)THEN535                                    KH
·265 IFA$=CHR$(134)THEN560                                    JM
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                       EG
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                       AB
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295             DL
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295             MD
·290 GOSUB415:GOTO250                                         JJ
·295 PRINTA$"[c P][LEFT]";                                    OA
·300 GOTO205                                                  CF
·305 IFA>0THEN320                                             PG
·310 A=-1:IFB=1THEN330                                        OI
·315 GOTO220                                                  BM
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                   HG
·325 A=A-1                                                    BE
·330 PRINTCHR$(20);:GOTO220                                   LK
·335 REM LAST LINE                                            AD
·340 PRINT" ":T=AD-(INT(AD/256)*256)                          GJ
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255                 PL
·350 NEXT                                                     IA
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                           NF
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                          HN
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                   JA
·370 REM BELL AND ERROR MESSAGES                              FL
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415      DA
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415          FF
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
5                                                             HD
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
GOTO415                                                       OK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415           FN
·400 PRINT"?ERROR IN SAVE":GOTO415                            PP
·405 PRINT"?ERROR IN LOAD":GOTO415                            PO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                  PG
·415 POKE54276,17:POKE54276,16:RETURN                         BH
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN         IM
·425 REM GET FOUR DIGIT HEX                                   PC
·430 PRINT:PRINTB$;:INPUTT$                                   GM
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                         NP
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
380:GOTO430                                                   FJ
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN      GF
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN              EH
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN              KP
·460 T(A)=16:RETURN                                           NP
·465 REM ADRESS CHECK                                         LI
·470 IFAD>ENTHEN385                                           LB
·475 IFB<SRORB>ENTHEN390                                      KC
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395             MG
·485 RETURN                                                   IM
·490 REM ADDRESS TO HEX                                       EB
·495 AC=AD:A=4096:GOSUB520                                    FD
·500 A=256:GOSUB520                                           PE
·505 A=16:GOSUB520                                            MI
·510 A=1:GOSUB520                                             IL
·515 RETURN                                                   IM
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530               PE
·525 A$=CHR$(T+48)                                            JP
·530 PRINTA$;:AC=AC-A*T:RETURN                                AC
·535 A$="**SAVE**":GOSUB585                                   LH
·540 OPEN1,T,1,A$:SYS680:CLOSE1                               LH
·545 IFST=0THENEND                                            EO
·550 GOSUB400:IFT=8THENGOSUB420                               CM
·555 GOTO535                                                  CL
·560 A$="**LOAD**":GOSUB585                                   NE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                               MF
·570 IFST=64THEN195                                           LC
·575 GOSUB405:IFT=8THENGOSUB420                               AN
·580 GOTO560                                                  CL
·585 PRINT" ":PRINTTAB(14)A$                                  FG
·590 PRINT:A$="":INPUT"FILENAME";A$                           OM
·595 IFA$=""THEN590                                           DD
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                         DF
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN             IG
·610 IFB$<>"T"THEN605                                         BO
·615 RETURN                                                   IM
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B                 OH
·625 GOSUB475:IFB=0THEN620                                    GH
·630 PRINT:GOTO195                                            PH
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B                 FA
·640 GOSUB475:IFB=0THEN635                                    IB
·645 PRINT:GOTO670                                            PP
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
OSUB410:GOTO195                                               NK
·655 PRINT" ";:NEXTB                                          EC
·660 PRINT:AD=AD+8                                            GN
·665 GETB$:IFB$=CHR$(136)THEN195                              LI
·670 GOSUB495:PRINT": ";:GOTO650                              IB
```

MAKING A WAVE IN 40 COLUMNS

FROM PAGE 26

Assembler required for program entry! See introductory article.

PLOTWAVE.S

```
*
* PLOTWAVE.S
*
           ORG    $1300
*
HMAX       EQU    320
BASE       EQU    $2000
*
TEMPA      EQU    $FA
TEMPB      EQU    TEMPA+2
*
TABSIZ     EQU    $0B00
*
HPSN       EQU    TABSIZ+2
VPSN       EQU    HPSN+2
CHAR       EQU    VPSN+1
ROW        EQU    CHAR+1
LINE       EQU    ROW+1
BYTE       EQU    LINE+1
BITT       EQU    BYTE+2
*
MPRL       EQU    BITT+1
MPRH       EQU    MPRL+1
MPDL       EQU    MPRH+1
MPDH       EQU    MPDL+1
PRODL      EQU    MPDH+1
PRODH      EQU    PRODL+1
*
           JMP    START
*
* BLOCK FILL ROUTINE
*
* 16-BIT MULTIPLICATION
*
MULT16     LDA    #0
           STA    PRODL
           STA    PRODH
           LDX    #17
           CLC
MULT       ROR    PRODH
           ROR    PRODL
           ROR    MPRH
           ROR    MPRL
           BCC    CTDOWN
           CLC
           LDA    MPDL
           ADC    PRODL
           STA    PRODL
           LDA    MPDH
           ADC    PRODH
           STA    PRODH
CTDOWN     DEX
           BNE    MULT
           RTS
*
* PLOT ROUTINE
*
* 8-BIT DIVISION
* (ROW=VPSN/8)
*
START      LDA    VPSN
           LSR    A
           LSR    A
           LSR    A
           STA    ROW
*
* CHAR=HPSN/8
*
           LDA    HPSN
           STA    TEMPA
           LDA    HPSN+1
           STA    TEMPA+1
           LDX    #3
DLOOP      LSR    TEMPA+1
           ROR    TEMPA
           DEX
           BNE    DLOOP
           LDA    TEMPA
           STA    CHAR
*
* LINE=VPSN AND 7
*
           LDA    VPSN
           AND    #7
           STA    LINE
*
* BITT=7-(HPSN AND 7)
*
           LDA    HPSN
           AND    #7
           STA    BITT
           SEC
           LDA    #7
           SBC    BITT
           STA    BITT
*
* FORMULA TO PLOT DOT
*
* MULTIPLY ROW * HMAX
*
           LDA    ROW
           STA    MPRL
           LDA    #0
           STA    MPRH
           LDA    #<HMAX
           STA    MPDL
           LDA    #>HMAX
           STA    MPDH
           JSR    MULT16
           LDA    MPRL
           STA    TEMPA
           LDA    MPRL+1
           STA    TEMPA+1
*
* ADD PRODUCT TO BASE
*
           CLC
           LDA    #<BASE
           ADC    TEMPA
           STA    TEMPA
           LDA    #>BASE
           ADC    TEMPA+1
           STA    TEMPA+1
*
* MULTIPLY 8 * CHAR
*
           LDA    #8
           STA    MPRL
           LDA    #0
           STA    MPRH
           LDA    CHAR
           STA    MPDL
           LDA    #0
           STA    MPDH
           JSR    MULT16
           LDA    MPRL
           STA    TEMPB
           LDA    MPRH
           STA    TEMPB+1
*
* ADD LINE
*
           CLC
           LDA    TEMPB
           ADC    LINE
           STA    TEMPB
           LDA    TEMPB+1
           ADC    #0
           STA    TEMPB+1
*
* TEMPA + TEMPB = BYTE
*
           CLC
           LDA    TEMPA
           ADC    TEMPB
           STA    TEMPB
           LDA    TEMPA+1
           ADC    TEMPB+1
           STA    TEMPB+1
*
* BYTE=BYTE OR2^BIT
*
           LDX    BITT
           INX
           LDA    #0
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
166          SEC
167 SQUARE   ROL
168          DEX
169          BNE    SQUARE
170          LDY    #0
171          ORA    (TEMPB),Y
172          STA    (TEMPB),Y
173          RTS
174 *
```

MAKEWAVE.BAS

```
10 REM *** MAKEWAVE.BAS ***                                   BP
20 COLOR 0,1:COLOR 4,1:GRAPHIC 1,1                            OI
30 BANK 0:POKE 2604,120:BANK 15:REM PUT BIT MAP AT $2000, COLOR MAP AT $1C00   PF
40 POKE 216,32:REM SET BIT-MAP FLAG                           JJ
50 POKE 53265,PEEK(53265)OR32:REM ENABLE BIT-MAP MODE         BM
60 BASE=8192:REM START BIT MAP AT $2000                       IA
70 REM *** DRAW BASE LINE ***                                 NH
80 Y=100:REM PLACE Y AXIS AT MIDSCREEN                        HI
90 FOR X=0 TO 319:REM DRAW X AXIS                             IL
100 GOSUB 170:NEXT X                                          EA
110 REM *** DRAW SINE WAVE ***                                PE
120 FOR X=0 TO 319 STEP .5                                    BN
130 Y=INT(100+80*SIN(X/10))                                   BJ
140 GOSUB 170:NEXT X                                          EA
150 GOTO 150                                                  CG
160 FOR X=0 TO 319: REM DRAW X AXIS                           IL
170 COL=INT(X/8)                                              PD
180 ROW=INT(Y/8)                                              AG
190 LINE=Y AND 7                                              BC
200 BYTE=BASE+ROW*320+8*COL+LINE                              GJ
210 BITT=7-(X AND 7)                                          GB
220 POKE BYTE,PEEK(BYTE) OR (2[UPARROW]BITT)                  KG
230 RETURN                                                    IM
```

MAKEWAVE2.BAS

```
10 REM *** MAKEWAVE2.BAS ***                                  DF
20 COLOR 0,1:COLOR 4,1:GRAPHIC 1,1                            OI
30 HPSN=DEC("0B02"):VPSN=DEC("0B04")                          HO
40 IF A=0 THEN A=1:BLOAD "PLOTWAVE.O"                         FF
50 HI=INT(4864/256):LO=4864-HI*256:REM ADDRESS OF 'PLOT' ROUTINE   NG
60 POKE 4633,LO:POKE 4634,HI:REM SET USR(X) POINTERS          OA
70 REM *** DRAW BASE LINE ***                                 NH
80 Y=100:HI=INT(Y/256):LO=Y-HI*256                            BF
90 POKE VPSN,LO:POKE VPSN+1,HI                                CA
100 FOR X=0 TO 319:HI=INT(X/256):LO=X-HI*256                  EO
110 POKE HPSN,LO:POKE HPSN+1,HI                               FI
120 B=USR(C):NEXT X                                           FH
130 REM *** DRAW SINE WAVE ***                                PE
140 FOR X=0 TO 319 STEP .5                                    BN
150 HI=INT(X/256):LO=X-HI*256                                 DG
160 POKE HPSN,LO:POKE HPSN+1,HI                               FI
170 Y=INT(100+80*SIN(X/10))                                   BJ
180 HI=INT(Y/256):LO=Y-HI*256                                 LO
190 POKE VPSN,LO:POKE VPSN+1,HI                               CA
200 B=USR(C):NEXT X                                           FH
210 GOTO 210                                                  BP
```

APPROACHING INFINITY
FROM PAGE 20

THE INTEGRATOR

```
10 REM                                                        JD
20 REM        THE INTEGRATOR                                  HN
30 REM        RUPERT REPORT #32                               OI
40 REM                                                        JD
50 FALSE=0 : TRUE=NOT FALSE                                   MH
60 C128=FALSE :IF DS$<>"" THEN C128=TRUE                      PG
70 N=5 :REM INITIAL NUMBER OF INTERVALS                       IM
80 GOSUB 190 :REM  DEFINE FUNCTION  AND SPECIFY LIMITS        GK
90 REM = = = = =  MAIN LOOP  = = = = =                        EB
100 IF C128 THEN GOSUB 260   :REM  PLOT FUNCTION - (C128 ONLY)   HM
110 GOSUB 350 :REM INTEGRATE FUNCTION                         BA
120 GOSUB 480 :REM SHOW RESULTS                               FF
130 GOSUB 530 :REM GET # OF INTERVALS                         GK
140 IF NOT FINI THEN 100                                      JJ
150 REM - CHANGE NEXT LINE FOR DESIRED        DEFAULT GRAPHICS MODE -   GC
160 IF C128 THEN GRAPHIC 5                                    DA
170 END                                                       IC
180 REM = = = = = = = = = = = = = = = = =                     GD
190   REM = DEFINE FUNCTION & LIMITS =                        JB
200 DEF FNA(X) = SQR(R*R-X*X)                                 EH
210 R=150   : REM CIRCLE OF RADIUS 150                        FH
220 X0=0 : X1=R  :REM INTEGRATION LIMITS                      NP
230 SS=1         :REM  GRAPH STEP SIZE                        BA
240 DX=(X1-X0)/N :REM  INTERVAL SIZE                          KB
250 RETURN                                                    IM
260   REM = SET UP & DRAW FUNCTION =                          NA
270 GRAPHIC 2,1,22                                            PE
280 DRAW 1,10,0 TO 10,170 TO 320,170 : REM  DRAW AXES         EO
290 FOR X=X0 TO X1 STEP SS                                    LK
300 Y=FNA(X)                                                  KN
310 XP=10+X : YP=170-Y                                        ON
320 DRAW 1,XP,YP                                              NG
330 NEXT                                                      IA
340 RETURN                                                    IM
```

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```
•350   REM = INTEGRATE FUNCTION =              FF
•360 S0=SUM : SUM=0                            DG
•370 FOR KK=.5 TO N                            CN
•380 X=X0+DX*KK                                DE
•390 Y=FNA(X)                                  KN
•400 AREA=Y*DX                                 HK
•410 SUM=SUM+AREA                              GI
•420 IF NOT C128 THEN 460                      FG
•430 XU=12+X-DX/2 : YU=170-Y                   OE
•440 XL=10+X+DX/2 : YL=170                     EA
•450 BOX 1,XU,YU,XL,YL,0,1                     BB
•460 NEXT                                      IA
•470 RETURN                                    IM
•480   REM  = SHOW RESULTS =                   JC
•490 IF N0=0 OR NOT C128 THEN 510              EL
•500 PRINT"INTERVALS :" N0 " AREA :" S0        JL
•510 PRINT"INTERVALS :" N  " AREA :" SUM       CD
•520 RETURN                                    IM
•530   REM = UPDATE NUMBER OF INTERVALS =      DK
•540 N0=N                                      ID
•550 INPUT"HOW MANY INTERVALS (0 TO STOP)
 ";N                                           IJ
•560 IF N<1 THEN FINI=TRUE : GOTO 580          AB
•570 DX=(X1-X0)/N                              FP
•580 RETURN                                    IM
•590 REM  =+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+     OG
•600 REM  HIGH-RES C128 GRAPHICS SCREEN
          DUMP TO EPSON MX-80 PRINTER          CD
•610 REM   (WHEN PROGRAM IS DONE, TYPE
                   RUN 1000)                   FP
•1000 E$=CHR$(27) : N1=200 : N2=0              PI
•1010 OPEN222,4 : PRINT#222,E$"A"CHR$(8)       FB
•1020 FOR COL=0 TO 39                          HB
•1030 FOR ROW=24 TO 0 STEP -1                  MJ
•1040 M=8192+8*COL+320*ROW                     OD
•1050 FOR LNE=7 TO 0 STEP -1                   MH
•1060 A$=A$+CHR$(PEEK(M+LNE))                  IB
•1070 NEXT LNE : NEXT ROW                      AJ
•1080 PRINT#222,E$"K"CHR$(N1)CHR$(N2)A$        OC
•1090 A$="" : NEXT COL                         BJ
•1100 PRINT#222 : CLOSE222 :END                GL
```

REVERSI
FROM PAGE 35

```
•100 REM  *****************************        GH
•110 REM  *                           *        OO
•120 REM  *          REVERSI          *        BF
•130 REM  *                           *        OO
•140 REM  *         FOR  C-64         *        JM
•150 REM  *                           *        OO
•160 REM  *                           *        OO
•170 REM  *       BY: ROD CARTY       *        CI
•180 REM  *                           *        OO
•190 REM  *                           *        OO
•200 REM  *****************************        GH
•920 PRINT "[CLEAR]"                           HH
•930 PRINT "[HOME]": PRINT "INSTRUCTIONS?
 (Y OR N)                                      AA
•940 GET K$                                    DC
•950 IF K$= "Y" THEN 7500                      DJ
•960 IF K$<> "N" THEN 930                      MM
•970 CP= 1: PO= 173                            PH
•980 REM BACKGROUND                            JH
•990 REM ----------                            JB
•1000 C= 55296: B= 1024                        GM
•1010 PRINT "[CLEAR]"                          JJ
•1020 POKE 53280, 13: POKE 53281, 13           EB
•1030 PRINT"[BLACK]"                           HA
•1060 FOR J= 0 TO 1000                         JK
•1070 POKE C+ J, 13                            MJ
•1080 POKE B+ J, 224                           OL
•1090 NEXT J                                   OM
•1100 POKE 53281, 0                            EC
•1120 REM BOARD                                CL
•1130 REM -----                                KO
•1140 PRINT "[HOME]"                           BK
•1150 PRINT:PRINT:PRINT CHR$(153)              BI
•1160 FOR J=1 TO 8                             AL
•1170 PRINT TAB(13);"[RVSON][s O][s P][s
 O][s P][s O][s P][s O][s P][s O][s P][s
 O][s P][s O][s P][s O][s P][RVSOFF]"          KJ
•1180 PRINT TAB(13);"[RVSON][s L][s @][s
 L][s @][s L][s @][s L][s @][s L][s @][s
 L][s @][s L][s @][s L][s @][RVSOFF]"          EJ
•1190 NEXT J                                   OM
•1200 PRINT "[HOME]"                           BK
•1580 REM SET UP CENTER PIECES                 GC
•1590 REM ---------------------                BE
•1600 POKE B+419, 213: POKE C+419, 1           FE
•1610 POKE B+420, 201: POKE C+420, 1           CF
•1620 POKE B+421, 213: POKE C+421, 5           FA
•1630 POKE B+422, 201: POKE C+422, 5           FJ
•1640 POKE B+459, 202: POKE C+459, 1           DM
•1650 POKE B+460, 203: POKE C+460, 1           DP
•1660 POKE B+461, 202: POKE C+461, 5           FI
•1670 POKE B+462, 203: POKE C+462, 5           JL
•1700 POKE B+499, 213: POKE C+499, 5           EI
•1710 POKE B+500, 201: POKE C+500, 5           HJ
•1720 POKE B+501, 213: POKE C+501, 1           LM
•1730 POKE B+502, 201: POKE C+502, 1           EF
•1740 POKE B+539, 202: POKE C+539, 5           DE
•1750 POKE B+540, 203: POKE C+540, 5           CL
•1760 POKE B+541, 202: POKE C+541, 1           EM
•1770 POKE B+542, 203: POKE C+542, 1           BP
•1880 REM PLAYERS' SCORES                      PD
•1890 REM ---------------                      HB
•1900 PG=0: PW=0                               FP
•1930 FOR S= 173 TO 764 STEP 2                 BL
•1940 IF PEEK (B+S) <> 213 THEN 1990           PE
•1950 PS= PEEK (C+S) AND 15                    EI
```

```
·1960 IF PS= 1 THEN 1980                          BA
·1970 PG=PG+1: GOTO 1990                          KI
·1980 PW=PW+1                                     OG
·1990 NEXT S                                      PD
·2030 GOTO 2100                                   HF
·2060 PRINT"[HOME][20"[DOWN]"]"                   IC
·2070 RETURN                                      IM
·2100 PRINT "[HOME]":PRINT                        OE
·2110 PRINT TAB(7);"GREEN HAS[3" "]";TAB(
 23);"WHITE HAS[3" "]"                            FO
·2120 PRINT"[HOME]":PRINT                         LM
·2150 PRINT TAB(7);"GREEN HAS";PG;TAB(23)
 ;"WHITE HAS";PW                                  GB
·2160 IF PG+ PW = 64 THEN 7000                    HM
·2170 IF PG= 0 THEN 7090                          BL
·2180 IF PW= 0 THEN 7090                          CL
·2220 REM CURSOR POSITION DISPLAY                 KD
·2230 REM -----------------------                 HJ
·2250 CO= PEEK (C+ PO) AND 15                     HL
·2260 IF CO= 13 THEN 2280                         DJ
·2270 RC= 13: GOTO 2310                           LP
·2280 IF CP> 0 THEN 2300                          BP
·2290 RC= 5: GOTO 2310                            GO
·2300 RC= 1                                       JB
·2310 POKE C+ PO, RC: POKE C+ PO+ 1, RC:
 POKE C+ PO+ 40, RC: POKE C+ PO+ 41, RC           OK
·2320 FOR I= 1 TO 500: NEXT                       EI
·2330 POKE C+ PO, CO: POKE C+ PO+ 1, CO:
 POKE C+ PO+ 40, CO: POKE C+ PO+ 41, CO           LA
·2340 REM CHECK IF PLAYER PASSES                  MB
·2350 REM ----------------------                  FF
·2360 GET K$                                      DC
·2370 IF K$= "[s P]" THEN 2390                    OG
·2380 GOTO 2500                                   HJ
·2390 GOSUB 2060                                  HC
·2400 PRINT TAB(14);"PLAYER  PASSES"              AI
·2410 FOR I= 1 TO 2000: NEXT                      HB
·2420 GOSUB 2060                                  HC
·2430 PRINT CHR$(153);TAB(14);"[RVSON][14
 " "][RVSOFF]";CHR$(158)                          DO
·2440 CP= -CP                                     JD
·2500 IF CP>0 THEN 2540                           MI
·2510 JO= PEEK(56321): GOTO 2570                  FK
·2540 JO= PEEK(56320)                             II
·2550 REM INPUT FROM JOYSTICK PORTS               LC
·2560 REM --------------------------              LO
·2570 IF JO= 250 OR JO= 122 THEN 3200             IO
·2580 IF JO= 249 OR JO= 121 THEN 3250             ME
·2590 IF JO= 246 OR JO= 118 THEN 3300             PD
·2600 IF JO= 245 OR JO= 117 THEN 3350             LM
·2610 IF JO= 251 OR JO= 123 THEN 3400             EE
·2620 IF JO= 254 OR JO= 126 THEN 3450             NB
·2630 IF JO= 253 OR JO= 125 THEN 3500             KJ
·2640 IF JO= 247 OR JO= 119 THEN 3550             FO
·2650 IF JO= 239 OR JO= 111 THEN 3600             DP
·3000 FOR I= 1 TO 500: NEXT                       EI
·3010 GOTO 2250                                   HL
·3180 REM MOVE CURSOR                             PG
·3190 REM -----------                             MJ
·3200 PO= PO- 82: REM MOVE LEFT/UP                DF
·3210 IF PEEK (B+ PO)= 207 THEN 2250              HF
·3220 IF PEEK (B+ PO)= 213 THEN 2250              KI
·3230 PO= PO+ 82: GOTO 2250                       CK
·3250 PO= PO+ 78: REM MOVE LEFT/DOWN              PP
·3260 IF PEEK (B+ PO)= 207 THEN 2250              HF
·3270 IF PEEK (B+ PO)= 213 THEN 2250              KI
·3280 PO= PO- 78: GOTO 2250                       NO
·3300 PO= PO- 78: REM MOVE RIGHT/UP               LA
·3310 IF PEEK (B+ PO)= 207 THEN 2250              HF
·3320 IF PEEK (B+ PO)= 213 THEN 2250              KI
·3330 PO= PO+ 78: GOTO 2250                       AH
·3350 PO= PO+ 82: REM MOVE RIGHT/DOWN             JC
·3360 IF PEEK (B+ PO)= 207 THEN 2250              HF
·3370 IF PEEK (B+ PO)= 213 THEN 2250              KI
·3380 PO= PO- 82: GOTO 2250                       OB
·3400 PO= PO- 2: REM MOVE LEFT                    IF
·3410 IF PEEK (B+ PO)= 207 THEN 2250              HF
·3420 IF PEEK (B+ PO)= 213 THEN 2250              KI
·3430 PO= PO+ 2: GOTO 2250                        OI
·3450 PO= PO- 80: REM MOVE UP                     GF
·3460 IF PEEK (B+ PO)= 207 THEN 2250              HF
·3470 IF PEEK (B+ PO)= 213 THEN 2250              KI
·3480 PO= PO+ 80: GOTO 2250                       BA
·3500 PO= PO+ 80: REM MOVE DOWN                   CG
·3510 IF PEEK (B+ PO)= 207 THEN 2250              HF
·3520 IF PEEK (B+ PO)= 213 THEN 2250              KI
·3530 PO= PO-80: GOTO 2250                        AC
·3550 PO= PO+ 2: REM MOVE RIGHT                   PA
·3560 IF PEEK (B+ PO)= 207 THEN 2250              HF
·3570 IF PEEK (B+ PO)= 213 THEN 2250              KI
·3580 PO= PO- 2: GOTO 2250                        OJ
·3590 REM PIECE PLAYED THIS POSITION              DO
·3595 REM -------------------------               NB
·3600 IF PEEK (B+ PO)= 207 THEN 3690              MG
·3610 GOSUB 2060                                  HC
·3620 PRINT TAB(12); "POSITION  OCCUPIED"         KM
·3630 FOR I= 1 TO 1000: NEXT                      II
·3640 GOSUB 2060                                  HC
·3650 PRINT CHR$(153);TAB(12);"[RVSON][20
 " "][RVSOFF]";CHR$(158)                          KI
·3660 GOTO 2250                                   HL
·3670 REM CHECK FOR LEGIT MOVE                    CI
·3680 REM --------------------                    BE
·3690 IF CP< 0 THEN 3710                          AF
·3700 P1= 1: P2= 5: GOTO 3740                     FC
·3710 P1= 5: P2= 1                                HD
·3720 REM LOOK UP                                 LN
·3730 REM -------                                 AJ
·3740 M= 80                                       IK
·3750 CS= PEEK (C+ PO- M) AND 15                  NC
·3760 IF CS= P1 THEN 3840                         GP
·3770 IF CS= 13 THEN 3840                         FE
·3780 M= M+ 80                                    KN
·3790 CS= PEEK (C+ PO- M) AND 15                  NC
·3800 IF CS= P1 THEN 5000                         FF
·3810 IF CS= P2 THEN 3780                         HD
```

```
•3820 REM LOOK UP & RIGHT                    MJ
•3830 REM ----------------                   HB
•3840 M= 78                                  JL
•3850 CS= PEEK (C+ PO- M) AND 15             NC
•3870 IF CS= P1 THEN 3950                    HD
•3880 IF CS= 13 THEN 3950                    FE
•3890 M= M+ 78                               LE
•3900 CS= PEEK (C+ PO- M) AND 15             NC
•3910 IF CS= P1 THEN 5000                    FF
•3920 IF CS= P2 THEN 3890                    HH
•3930 REM LOOK RIGHT                         KJ
•3940 REM ----------                         JB
•3950 M= 2                                   FH
•3960 CS= PEEK (C+ PO+ M) AND 15             ND
•3970 IF CS= P1 THEN 4050                    FL
•3980 IF CS= 13 THEN 4050                    DM
•3990 M= M+ 2                                HJ
•4000 CS= PEEK (C+ PO+ M) AND 15             ND
•4010 IF CS= P1 THEN 5000                    FF
•4020 IF CS= P2 THEN 3990                    HI
•4030 REM LOOK DOWN & RIGHT                  AJ
•4040 REM -----------------                  LG
•4050 M= 82                                  II
•4060 CS= PEEK (C+ PO+ M) AND 15             ND
•4070 IF CS= P1 THEN 4150                    FM
•4080 IF CS= 13 THEN 4150                    DF
•4090 M= M+ 82                               KP
•4100 CS= PEEK (C+ PO+ M) AND 15             ND
•4110 IF CS= P1 THEN 5000                    FF
•4120 IF CS= P2 THEN 4090                    EA
•4130 REM LOOK DOWN                          EB
•4140 REM ---------                           GO
•4150 M= 80                                  IK
•4160 CS= PEEK (C+ PO+ M) AND 15             ND
•4170 IF CS= P1 THEN 4250                    FF
•4180 IF CS= 13 THEN 4250                    DG
•4190 M= M+ 80                               KN
•4200 CS= PEEK (C+ PO+ M) AND 15             ND
•4210 IF CS= P1 THEN 5000                    FF
•4220 IF CS= P2 THEN 4190                    FJ
•4230 REM LOOK DOWN & LEFT                   LL
•4240 REM ----------------                   JA
•4250 M= 78                                  JL
•4260 CS= PEEK (C+ PO+ M) AND 15             ND
•4270 IF CS= P1 THEN 4350                    FG
•4280 IF CS= 13 THEN 4350                    DH
•4290 M= M+ 78                               LE
•4300 CS= PEEK (C+ PO+ M) AND 15             ND
•4310 IF CS= P1 THEN 5000                    FF
•4320 IF CS= P2 THEN 4290                    FK
•4330 REM LOOK LEFT                          CC
•4340 REM ---------                          GO
•4350 M= 2                                   FH
•4360 CS= PEEK (C+ PO- M) AND 15             NC
•4370 IF CS= P1 THEN 4450                    FH
•4380 IF CS= 13 THEN 4450                    DI
•4390 M= M+ 2                                HJ
•4400 CS= PEEK (C+ PO- M) AND 15             NC
•4410 IF CS= P1 THEN 5000                    FF
•4420 IF CS= P2 THEN 4390                    FL
•4430 REM LOOK LEFT & UP                     EB
•4440 REM --------------                     FF
•4450 M= 82                                  II
•4460 CS= PEEK (C+ PO- M) AND 15             NC
•4470 IF CS= P1 THEN 4530                    FG
•4480 IF CS= 13 THEN 4530                    EP
•4490 M= M+ 82                               KP
•4500 CS= PEEK (C+ PO- M) AND 15             NC
•4510 IF CS= P1 THEN 5000                    FF
•4520 IF CS= P2 THEN 4490                    FM
•4530 GOSUB 2060                             HC
•4540 PRINT TAB(13);"SORRY, BAD  MOVE"       NO
•4550 FOR I= 1 TO 500: NEXT                  EI
•4560 GOSUB 2060                             HC
•4570 PRINT CHR$(153);TAB(13);"[RVSON][16
" "][RVSOFF]";CHR$(158)                      PD
•4580 GOTO 2250                              HL
•4980 REM LEGIT POSITION CHOICE              HO
•4990 REM ---------------------              DO
•5000 POKE B+PO,213: POKE B+PO+1,201: POK
E B+PO+40,202: POKE B+PO+41,203              KF
•5010 POKE C+PO,P1: POKE C+PO+1,P1: POKE
C+PO+40,P1: POKE C+PO+41,P1                  ND
•5020 REM LOOK UP                            LN
•5030 REM -------                            AJ
•5040 M= 80                                  IK
•5050 CS= PEEK (C+ PO- M) AND 15             NC
•5060 IF CS= P1 THEN 5200                    EP
•5070 IF CS= 13 THEN 5200                    DE
•5080 M= M+ 80                               KN
•5090 CS= PEEK (C+ PO- M) AND 15             NC
•5100 IF CS= P1 THEN 5130                    FD
•5110 IF CS= 13 THEN 5200                    DE
•5120 GOTO 5080                              HJ
•5130 M= M- 80                               KM
•5140 IF M= 0 THEN 5200                      KK
•5150 POKE C+PO-M,P1: POKE C+PO-M+1,P1: P
OKE C+PO-M+40,P1: POKE C+PO-M+41,P1          FJ
•5160 GOTO 5130                              GN
•5180 REM LOOK UP & RIGHT                    MJ
•5190 REM ---------------                    HB
•5200 M= 78                                  JL
•5210 CS= PEEK (C+ PO- M) AND 15             NC
•5220 IF CS= P1 THEN 5400                    FB
•5230 IF CS= 13 THEN 5400                    CO
•5240 M= M+ 78                               LE
•5250 CS= PEEK (C+ PO- M) AND 15             NC
•5260 IF CS= P1 THEN 5300                    FE
•5270 IF CS= 13 THEN 5400                    CO
•5280 GOTO 5240                              HH
•5300 M= M- 78                               LH
•5310 IF M= 0 THEN 5400                      KM
•5320 POKE C+PO-M,P1: POKE C+PO-M+1,P1: P
OKE C+PO-M+40,P1: POKE C+PO-M+41,P1          FJ
•5330 GOTO 5300                              HA
•5380 REM LOOK RIGHT                         KJ
```

```
•5390 REM -----------                          JB
•5400 M= 2                                     FH
•5410 CS= PEEK (C+ PO+ M) AND 15               ND
•5420 IF CS= P1 THEN 5600                      EL
•5430 IF CS= 13 THEN 5600                      FA
•5440 M= M+ 2                                  HJ
•5450 CS= PEEK (C+ PO+ M) AND 15               ND
•5460 IF CS= P1 THEN 5500                      EO
•5470 IF CS= 13 THEN 5600                      FA
•5480 GOTO 5440                                IB
•5500 M= M- 2                                  HK
•5510 IF M= 0 THEN 5600                        KG
•5520 POKE C+PO+M,P1: POKE C+PO+M+1,P1: P
 OKE C+PO+M+40,P1: POKE C+PO+M+41,P1           DH
•5530 GOTO 5500                                HC
•5580 REM LOOK RIGHT & DOWN                    BL
•5590 REM ------------------                   LG
•5600 M= 82                                    II
•5610 CS= PEEK (C+ PO+ M) AND 15               ND
•5620 IF CS= P1 THEN 5800                      EN
•5630 IF CS= 13 THEN 5800                      CK
•5640 M= M+ 82                                 KP
•5650 CS= PEEK (C+ PO+ M) AND 15               ND
•5660 IF CS= P1 THEN 5700                      HA
•5670 IF CS= 13 THEN 5800                      CK
•5680 GOTO 5640                                HL
•5700 M= M- 82                                 KO
•5710 IF M= 0 THEN 5800                        KI
•5720 POKE C+PO+M,P1: POKE C+PO+M+1,P1: P
 OKE C+PO+M+40,P1: POKE C+PO+M+41,P1           DH
•5730 GOTO 5700                                HE
•5780 REM LOOK DOWN                            EB
•5790 REM ----------                           GO
•5800 M= 80                                    IK
•5810 CS= PEEK (C+ PO+ M) AND 15               ND
•5820 IF CS= P1 THEN 6000                      FC
•5830 IF CS= 13 THEN 6000                      DH
•5840 M= M+ 80                                 KN
•5850 CS= PEEK (C+ PO+ M) AND 15               ND
•5860 IF CS= P1 THEN 5900                      EK
•5870 IF CS= 13 THEN 6000                      DH
•5880 GOTO 5840                                HF
•5900 M= M- 80                                 KM
•5910 IF M= 0 THEN 6000                        LN
•5920 POKE C+PO+M,P1: POKE C+PO+M+1,P1: P
 OKE C+PO+M+40,P1: POKE C+PO+M+41,P1           DH
•5930 GOTO 5900                                HG
•5980 REM LOOK DOWN & LEFT                     LL
•5990 REM -----------------                    JA
•6000 M= 78                                    JL
•6010 CS= PEEK (C+ PO+ M) AND 15               ND
•6020 IF CS= P1 THEN 6200                      FE
•6030 IF CS= 13 THEN 6200                      DJ
•6040 M= M+ 78                                 LE
•6050 CS= PEEK (C+ PO+ M) AND 15               ND
•6060 IF CS= P1 THEN 6100                      EP
•6070 IF CS= 13 THEN 6200                      DJ
•6080 GOTO 6040                                HA
•6100 M= M- 78                                 LH
•6110 IF M= 0 THEN 6200                        LP
•6120 POKE C+PO+M,P1: POKE C+PO+M+1,P1: P
 OKE C+PO+M+40,P1: POKE C+PO+M+41,P1           DH
•6130 GOTO 6100                                HJ
•6180 REM LOOK LEFT                            CC
•6190 REM ----------                           GO
•6200 M= 2                                     FH
•6210 CS= PEEK (C+ PO- M) AND 15               NC
•6220 IF CS= P1 THEN 6400                      EO
•6230 IF CS= 13 THEN 6400                      DD
•6240 M= M+ 2                                  HJ
•6250 CS= PEEK (C+ PO- M) AND 15               NC
•6260 IF CS= P1 THEN 6300                      FB
•6270 IF CS= 13 THEN 6400                      DD
•6280 GOTO 6240                                HC
•6300 M= M- 2                                  HK
•6310 IF M= 0 THEN 6400                        LJ
•6320 POKE C+PO-M,P1: POKE C+PO-M+1,P1: P
 OKE C+PO-M+40,P1: POKE C+PO-M+41,P1           FJ
•6330 GOTO 6300                                HD
•6380 REM LOOK LEFT & UP                       EB
•6390 REM ---------------                      FF
•6400 M= 82                                    II
•6410 CS= PEEK (C+ PO- M) AND 15               NC
•6420 IF CS= P1 THEN 6600                      HA
•6430 IF CS= 13 THEN 6600                      DF
•6440 M= M+ 82                                 KP
•6450 CS= PEEK (C+ PO- M) AND 15               NC
•6460 IF CS= P1 THEN 6500                      EL
•6470 IF CS= 13 THEN 6600                      DF
•6480 GOTO 6440                                IE
•6500 M= M- 82                                 KO
•6510 IF M= 0 THEN 6600                        ML
•6520 POKE C+PO-M,P1: POKE C+PO-M+1,P1: P
 OKE C+PO-M+40,P1: POKE C+PO-M+41,P1           FJ
•6530 GOTO 6500                                HN
•6540 REM ALL CHANGES DONE                     DO
•6550 REM -----------------                    JA
•6560 REM OTHER PLAYER'S TURN                  GI
•6570 REM --------------------                 PB
•6600 CP= -CP                                  JD
•6610 GOTO 1900                                HC
•6980 REM BOARD FULL, DECIDE WINNER            EI
•6990 REM --------------------------           LO
•7000 GOSUB 2060                               HC
•7010 IF PW= PG THEN 7070                      JF
•7020 IF PW> PG THEN 7050                      JC
•7030 PRINT TAB(12);"GREEN PLAYER WINS!"       GG
•7040 GOTO 7200                                HJ
•7050 PRINT TAB(12);"WHITE PLAYER WINS!"       MO
•7060 GOTO 7200                                HJ
•7070 PRINT TAB(17);"TIE GAME"                 HO
•7080 GOTO 7200                                HJ
•7090 PRINT TAB(17);"SHUT-OUT"                 AA
•7100 FOR I= 1 TO 500: NEXT                    EI
•7110 GOTO 7000                                HP
•7200 FOR I= 1 TO 500: NEXT                    EI
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
•7210 GOSUB 2060                              HC
•7220 PRINT:PRINT:PRINT "ANOTHER GAME (Y
 OR N)"                                       AC
•7230 GET K$                                  DC
•7240 IF K$= "Y" THEN 970                     DD
•7250 IF K$= "N" THEN 9000                    FB
•7260 GOTO 7210                               HG
•7480 REM COMMENTS AND INSTRUCTIONS           NJ
•7490 REM -------------------------           LO
•7500 PRINT "[CLEAR][DOWN][DOWN]THIS IS A
  REVERSI GAME[7"."]"                         KD
•7530 PRINT "[DOWN][DOWN]THE GAME BOARD I
 S THE"                                       CL
•7540 PRINT "STANDARD 8 BY 8 GRID."           AO
•7560 PRINT "[DOWN]THE OBJECT OF THE GAME
  IS TO"                                      NA
•7570 PRINT "REVERSE THE COLOR OF YOUR"       JO
•7580 PRINT "OPPONENT'S PIECES, AND SO"       PB
•7590 PRINT "CONVERTING THEM TO YOURS."       KI
•7600 PRINT "THE METHOD FOR THIS IS THUS:
 "                                            DM
•7620 PRINT "[DOWN]BRACKET THE OPPOSING P
 LAYER'S"                                     FE
•7630 PRINT "PIECE OR PIECES WITH ONE NEW
 "                                            EH
•7640 PRINT "AND AT LEAST ONE EXISTING"       JO
•7650 PRINT "PIECE OF YOUR OWN."              LN
•7660 PRINT "AT THE END OF THE GAME, THE"     DC
•7670 PRINT "PLAYER WITH THE GREATEST NUM
 BER"                                         NJ
•7680 PRINT "OF PIECES ON THE BOARD WINS.
 "                                            IK
•7690 PRINT "TO CONTINUE, PLEASE PRESS <
 RETURN >"                                    EN
•7700 INPUT A$                                AI
•7710 PRINT "[CLEAR][DOWN][DOWN]GREEN CUR
 SOR MOVEMENT IS ACCOMPLISHED"                OI
•7730 PRINT "BY A JOYSTICK IN CONTROL POR
 T #1,"                                       MO
•7740 PRINT"OR BY THE FOLLOWING KEYS:"        EI
•7760 PRINT "[DOWN]PRESS < 1 > FOR UP"        BE
•7770 PRINT"PRESS < [BACKARROW] > FOR DOW
 N"                                           EM
•7780 PRINT"PRESS < CTRL > FOR LEFT"          CH
•7790 PRINT"PRESS < 2 > FOR RIGHT, AND"       LP
•7800 PRINT"PRESS < SPACE > FOR SELECT"       BO
•7810 PRINT "[DOWN]WHITE CURSOR MOVEMENT
 IS ACCOMPLISHED"                             KO
•7820 PRINT "BY A JOYSTICK IN CONTROL POR
 T #2."                                       MN
•7840 PRINT "[DOWN][DOWN]IN ADDITION, PRE
 SSING < SHIFT P >"                           OC
•7850 PRINT "ALLOWS A PLAYER PASS."           HP
•7870 PRINT "[DOWN]CURSOR COLOR INDICATES
 "                                            DB
•7880 PRINT"WHICH PLAYER'S TURN IT IS."       FH
•7900 PRINT "[DOWN]PRESS < RETURN > TO CO
 NTINUE."                                     JN
•7910 INPUT A$                                AI
•7920 PRINT "[CLEAR][DOWN][DOWN]THIS IS S
 TRICTLY A TWO- PLAYER"                       OJ
•7930 PRINT "GAME, WITH NO PROVISION FOR
 GIVING"                                      IJ
•7940 PRINT "WEAKER PLAYERS CORNER ADVANT
 AGES."                                       AG
•7960 PRINT "[DOWN]HOWEVER, A TURN OR TWO
  PASSED EARLY"                               DC
•7970 PRINT "IN THE GAME SHOULD DO THE JO
 B, WHILE"                                    GF
•7980 PRINT "INTRODUCING AN ELEMENT OF VA
 RIETY FOR"                                   NE
•7990 PRINT "EXPERTS AT THE GAME."            ND
•8010 PRINT "[DOWN]PRESS < RETURN > TO ST
 ART."                                        II
•8020 INPUT A$                                AI
•8030 GOTO 970                                EO
•9000 END                                     IC
```

STEP ON IT
FROM PAGE 39

```
•10 DIMD$(14),A(39),B(1):D$(0)="[HOME]":F
 ORX=1TO14:D$(X)=D$(X-1)+"[DOWN]":NEXT:S=
 54272                                        AA
•20 FORX=STOS+23:POKEX,0:NEXT:POKES+6,240
 :POKES+8,80:POKES+12,6:POKES+24,15           EM
•30 A$="[s N][c Y][s M][3" "][s N][c Y][s
  M][3" "][s N][c Y][s M][3" "][s N][c Y]
 [s M][3" "][s N]":B$="[s N][3" "][s M][c
  P][s N][3" "][s M][c P][s N][3" "][s M]
 [c P][s N][3" "][s M][c P][s N]"             HB
•40 C$="[c H][3" "][c N][RVSON][CYAN] [RV
 SOFF][c 7][c H][3" "][c N][RVSON][CYAN]
 [RVSOFF][c 7][c H][3" "][c N][RVSON][CYA
 N] [RVSOFF][c 7][c H][3" "][c N][RVSON][
 CYAN] [RVSOFF][c 7][c H]":GOTO720            PE
•50 CS=CS+1:IFCS=2THENCS=0                    CP
•60 POKE53272,(PEEK(53272)AND240)ORB(CS):
 RETURN                                       CL
•70 GOSUB50:JS=(PEEK(56320)AND15):IFJS=6T
 HENPOKE2041,193:GOTO120                      OK
•80 IFJS=5THENPOKE2041,193:GOTO140            IO
•90 IFJS=9THENPOKE2041,194:GOTO160            EB
•100 IFJS=10THENPOKE2041,194:GOTO180          OI
•110 GOTO250                                  CD
•120 IFPEEK(B2-117)=32THEN250                 AH
•130 B2=B2-117:T3=T3+24:T4=T4-24:GOTO200      NF
•140 IFPEEK(B2+123)=32THEN250                 LB
•150 B2=B2+123:T3=T3+24:T4=T4+24:GOTO200      DE
•160 IFPEEK(B2+117)=32THEN250                 AG
•170 B2=B2+117:T3=T3-24:T4=T4+24:GOTO200      EA
```

```
•180 IFPEEK(B2-123)=32THEN250              MC
•190 B2=B2-123:T3=T3-24:T4=T4-24           AA
•200 POKEV+2,T3:POKEV+3,T4:IFB1=B2THEN390  OD
•210 IFPEEK(B2)=96THEN250                  LN
•220 W=129:DU=30:HI=15:LO=210:GOSUB230:HI
=12:LO=143:GOSUB230:SC=SC+25:GOTO240       OF
•230 POKES+1,HI:POKES,LO:POKES+4,W:FORDE=
1TODU:NEXT:POKES+4,W-1:RETURN              GN
•240 PRINTD$(0)TAB(5)SC:POKEB2,96:POKEB2+
C,0:G2=G2+1:IFG2=G1THEN430                 MG
•250 GOSUB50:FORDE=1TO100:NEXT:DI=INT(RND
(0)*4)+1:ONDIGOTO260,280,300,320           DL
•260 IFPEEK(B1-117)=32THEN70               JJ
•270 B1=B1-117:T1=T1+24:T2=T2-24:GOTO340   FG
•280 IFPEEK(B1+123)=32THEN70               FD
•290 B1=B1+123:T1=T1+24:T2=T2+24:GOTO340   KN
•300 IFPEEK(B1+117)=32THEN70               GE
•310 B1=B1+117:T1=T1-24:T2=T2+24:GOTO340   IB
•320 IFPEEK(B1-123)=32THEN70               IE
•330 B1=B1-123:T1=T1-24:T2=T2-24           JM
•340 POKEV,T1:POKEV+1,T2:IFB1=B2THEN390    OA
•350 IFPEEK(B1)=88THEN70                   GO
•360 PE=3:IFLE>3THENPE=2                   NL
•370 IFINT(RND(0)*PE)>0THEN70              CM
•380 G1=G1+1:POKEB1,88:POKEB1+C,7:GOTO70   AF
•390 K=1:W=33:DU=400:HI=3:LO=35:GOSUB230:
HI=5:LO=71:GOSUB230:HI=4:LO=48:GOSUB230    BH
•400 FORDE=1TO1000:NEXT:LI=LI-1:PRINTD$(0
)TAB(37)LI:POKEV+21,0:IFLI=0THEN630        EM
•410 B1=A1:B2=A2:T1=S1:T2=S2:T3=S3:T4=S4:
POKEV,T1:POKEV+1,T2:POKEV+2,T3             JA
•420 POKEV+3,T4:POKE2041,193:POKEV+21,3:G
OTO70                                      BO
•430 FORDE=1TO1500:NEXT:POKEV+21,0:IFK=1T
HEN470                                     MM
•440 BO=LE*100:SC=SC+BO:CS=0:GOSUB60:PRIN
T"[CLEAR]":POKE53281,2                     OD
•450 PRINTD$(12)TAB(11)"BONUS:"BO"TEBOS":
FORQ=1TOLE:POKES+11,33:FORDE=1TO250        NF
•460 NEXT:POKES+11,32:NEXT:FORDE=1TO750:N
EXT:LI=LI+1:IFLI>9THENLI=9                 CP
•470 K=0:LE=LE+1:CS=0:GOSUB60:PRINT"[CLEA
R]":POKE53281,6:POKE53280,0                AJ
•480 PRINTD$(12)TAB(10)"[WHITE]PREPARE FO
R LEVEL"LE:FORDE=1TO1000:NEXT              IN
•490 PP=PP+1:IFPP=4THENPP=1                DI
•500 ONPPGOTO510,530,550                   BD
•510 N1=1:N2=18:A1=1773:A2=1275:S1=248:S2
=184:S3=104:S4=88                          OB
•520 T=9:P1=21:P2=23:P3=35:P4=23:P5=21:P6
=37:GOTO570                                DA
•530 N1=19:N2=31:A1=1770:A2=1278:S1=224:S
2=184:S3=128:S4=88                         LN
•540 T=12:P1=15:P2=17:P3=25:P4=17:P5=15:P
6=27:GOTO570                               FP
•550 N1=32:N2=39:A1=1767:A2=1281:S1=200:S
2=184:S3=152:S4=88                         LN
•560 T=15:P1=9:P2=11:P3=15:P4=11:P5=9:P6=
17                                         ND
•570 PRINT"[CLEAR][c 7]":POKE53280,0:POKE
53281,0:PRINTD$(4);:FORX=1TO3              KF
•580 PRINTTAB(T+1)LEFT$(A$,P1):PRINTTAB(T
)LEFT$(B$,P2):PRINTTAB(T)LEFT$(C$,P3)      CA
•590 PRINTTAB(T)MID$(A$,3,P4):PRINTTAB(T+
1)MID$(B$,5,P5)                            EO
•600 IFX<3THENPRINTTAB(T+1)MID$(C$,5,P6):
NEXT                                       MI
•610 POKEA(N1),96:FORX=N1+1TO N2:POKEA(X)
,88:POKEA(X)+C,7:NEXT:G1=N2-N1:G2=0        IO
•620 PRINT"[WHITE]"D$(0)"TEBOS"SC;TAB(32)
"BOOTS"LI:GOTO410                          JN
•630 FORDE=1TO500:NEXT                     NN
•640 PRINT"[CLEAR]":POKE53281,5:CS=0:GOSU
B60:PRINTD$(9)TAB(15)"GAME OVER"           ML
•650 PRINTTAB(12)"[DOWN]FINAL SCORE:"SC:I
FSC>HSTHENHS=SC                            NF
•660 PRINTTAB(13)"HIGH SCORE:"HS           KM
•670 PRINTD$(14)TAB(4)"PRESS FIRE BUTTON
TO PLAY AGAIN"                             DD
•680 FB=-((PEEK(56320)AND16)=0):IFFB=1THE
N710                                       KG
•690 FORDE=1TO100:NEXT:PRINTD$(14)TAB(4)"
[31" "]"                                   NN
•700 FORDE=1TO100:NEXT:GOTO670             GN
•710 PP=0:SC=0:LI=4:LE=0:GOTO470           PL
•720 B(0)=4:B(1)=14:C=54272:V=53248:PRINT
"[CLEAR][c 7]":POKE53280,7:POKE53281,7     MK
•730 PRINTD$(5)TAB(6)"[RVSON]";:FORX=1TO2
9:PRINT" ";:NEXT:PRINT                     BF
•740 PRINTTAB(6)"[RVSON] [BLUE]";:FORX=1T
O27:PRINT" ";:NEXT:PRINT"[c 7] "           LB
•750 PRINTTAB(6)"[RVSON] [BLUE]  [RVSOFF]
[5" "][RVSON] [RVSOFF][5" "][RVSON] [RVS
OFF][5" "][RVSON] [RVSOFF][5" "][RVSON]
 [c 7] "                                   JB
•760 PRINTTAB(6)"[RVSON] [BLUE]  [RVSOFF]
 [RVSON][7" "][RVSOFF] [RVSON][3" "][RVS
OFF] [RVSON][5" "][RVSOFF] [RVSON][3" "]
[RVSOFF] [RVSON]  [c 7] "                  IF
•770 PRINTTAB(6)"[RVSON] [BLUE]  [RVSOFF]
[5" "][RVSON][3" "][RVSOFF] [RVSON][3" "
][RVSOFF][4" "][RVSON]  [RVSOFF][5" "][R
VSON]  [c 7] "                             JD
•780 PRINTTAB(6)"[RVSON] [BLUE][6" "][RVS
OFF] [RVSON][3" "][RVSOFF] [RVSON][3" "]
[RVSOFF] [RVSON][5" "][RVSOFF] [RVSON][6
" "][c 7] "                                HD
•790 PRINTTAB(6)"[RVSON] [BLUE]  [RVSOFF]
[5" "][RVSON][3" "][RVSOFF] [RVSON][3" "
][RVSOFF][5" "][RVSON] [RVSOFF] [RVSON][
6" "][c 7] "                               JD
•800 FORX=1TO2:PRINTTAB(6)"[RVSON] [BLUE]
";:FORQQ=1TO27:PRINT" ";:NEXT:PRINT"[c 7
] ":NEXT                                   DA
•810 PRINTTAB(6)"[RVSON] [BLUE] [RVSOFF][
5" "][RVSON] [RVSOFF] [RVSON][3" "][RVSO
```

```
FF] [RVSON][3" "][RVSOFF][5" "][RVSON] [
RVSOFF][5" "][RVSON] [c 7] "                JH
•820 PRINTTAB(6)"[RVSON] [BLUE] [RVSOFF]
[RVSON][3" "][RVSOFF] [RVSON] [RVSOFF]
[RVSON]  [RVSOFF] [RVSON][5" "][RVSOFF]
[RVSON][5" "][RVSOFF] [RVSON][3" "][c 7]
"                                           AH
•830 PRINTTAB(6)"[RVSON] [BLUE] [RVSOFF]
[RVSON][3" "][RVSOFF] [RVSON] [RVSOFF] [
RVSON] [RVSOFF] [RVSON] [RVSOFF] [RVSON]
[5" "][RVSOFF] [RVSON][5" "][RVSOFF] [RV
SON][3" "][c 7] "                           FP
•840 PRINTTAB(6)"[RVSON] [BLUE] [RVSOFF]
[RVSON][3" "][RVSOFF] [RVSON] [RVSOFF] [
RVSON]  [RVSOFF]  [RVSON][5" "][RVSOFF]
[RVSON][5" "][RVSOFF] [RVSON][3" "][c 7]
"                                           JJ
•850 PRINTTAB(6)"[RVSON] [BLUE] [RVSOFF][
5" "][RVSON] [RVSOFF] [RVSON][3" "][RVSO
FF] [RVSON][3" "][RVSOFF][5" "][RVSON][3
" "][RVSOFF] [RVSON][3" "][c 7] "           BJ
•860 PRINTTAB(6)"[RVSON] [BLUE]";:FORX=1T
027:PRINT" ";:NEXT:PRINT"[c 7] "            LB
•870 PRINTTAB(6)"[RVSON]";:FORX=1TO29:PRI
NT" ";:NEXT                                 GG
•880 W=17:DU=200:FORX=1TO22:READHI,LO:GOS
UB230:NEXT:GOTO900                          EL
•890 POKE53280,INT(RND(0)*16):RETURN        AJ
•900 FORX=1TO39:READA(X):NEXT:GOSUB890:FO
RX=12288TO12350:READE:POKEX,E:NEXT          AA
•910 GOSUB890:FORX=12352TO12414:READE:POK
EX,E:NEXT:GOSUB890:FORX=12416TO12478        FJ
•920 READE:POKEX,E:NEXT:GOSUB890:POKE5633
4,PEEK(56334)AND254:POKE1,PEEK(1)AND251     JH
•930 Q1=2:Q2=2:GOSUB980:Q1=5:Q2=5:GOSUB98
0:Q1=9:Q2=9:GOSUB980:Q1=15:Q2=15            JP
•940 GOSUB980:Q1=19:Q2=20:GOSUB980:Q1=32:
Q2=32:GOSUB980:Q1=48:Q2=57:GOSUB980         KE
•950 GOSUB980:Q1=77:Q2=78:GOSUB980:Q1=96:
Q2=96:GOSUB980:Q1=106:Q2=106:GOSUB980       CK
•960 Q1=111:Q2=111:GOSUB980:Q1=116:Q2=116
:GOSUB980:Q1=119:Q2=119:GOSUB980:Q1=160     AD
•970 Q2=160:GOSUB980:POKE1,PEEK(1)OR4:POK
E56334,PEEK(56334)OR1:GOTO990               BJ
•980 FORX=Q1*8TOQ2*8+7:POKE14336+X,PEEK(5
3248+X):NEXT:RETURN                         DM
•990 FORX=88*8TO88*8+7:READE:POKE14336+X,
E:NEXT:POKE2040,192:POKEV+39,7              HL
•1000 POKEV+40,15:POKEV+28,2:POKEV+37,9:P
OKEV+38,7:GOTO710                           EM
•1010 DATA18,209,14,24,15,210,18,209,14,2
4,15,210,16,195,12,143,10,143,12,143,11     JP
•1020 DATA48,10,143,10,143,9,104,10,143,1
2,143,14,24,11,48,9,104,7,233,9,104,8       AB
•1030 DATA97,1275,1281,1287,1293,1398,140
4,1410,1515,1521,1527,1533,1638,1644        JN
•1040 DATA1650,1755,1761,1767,1773,1278,1
284,1290,1401,1407,1518,1524,1530,1641      KK
•1050 DATA1647,1758,1764,1770,1281,1287,1
404,1521,1527,1644,1761,1767,48,255,12      IK
•1060 DATA61,255,188,15,255,240,30,60,120
,120,24,30,121,153,158,60,153,60,94,60      LE
•1070 DATA122,103,126,230,99,255,198,111,
0,246,111,60,246,97,153,134,177,231,141     DN
•1080 DATA104,255,22,176,126,13,104,0,22,
176,0,13,104,0,22,0,0,0,0,0,0,192,0,0       FL
•1090 DATA192,0,0,213,80,0,213,96,0,21,80
,0,21,96,0,21,80,0,21,96,0,21,80,0,21       IE
•1100 DATA96,0,21,80,0,21,88,0,21,85,0,21
,85,85,21,85,85,21,125,85,63,255,255,63     PH
•1110 DATA195,255,63,192,0,0,0,0,0,0,0,0,
0,3,0,0,3,0,5,87,0,9,87,0,5,84,0,9,84,0     JM
•1120 DATA5,84,0,9,84,0,5,84,0,9,84,0,5,8
4,0,37,84,0,85,84,85,85,84,85,85,84,85      DG
•1130 DATA125,84,255,255,252,255,195,252,
0,3,252,0,0,0,0,0,0,60,24,102,102,24,60     LP
•1140 DATA66,102                            LB
```

HIGHLIGHT
FROM PAGE 15

```
•10 REM *** HIGHLIGHT *** BUCK CHILDRESS
* 5/14/86 ***                               EG
•20 REM *** P.O. BOX 13575, SALEM, OR 973
09 ***                                      AH
•30 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=53000:L=110:C=11               GI
•40 PRINTCHR$(19)TAB(31)L:PRINT             IM
•50 FORB=0TOC:READA:IFA<0ORA>255THEN80      OB
•60 POKEJ+B,A:X=X+A:NEXTB:READCHECKSUM      CP
•70 IFX=CHECKSUMTHEN90                      PE
•80 PRINT"ERROR IN DATA LINE:"L:END         HL
•90 X=0:J=J+12:L=L+10:IFL<300THEN40         PD
•100 PRINT"DATA OK AND LOADED[3"."]":PRIN
T:PRINT"SYS 53[3"0"] TO ACTIVATE[3"."]":
END                                         GH
•110 DATA173,20,3,174,21,3,224,207,240,43
,141,240,1489                               HJ
•120 DATA207,142,241,207,169,14,141,243,2
07,141,246,207,2165                         CC
•130 DATA141,32,208,141,33,208,169,62,162
,207,160,1,1524                             AP
•140 DATA132,252,140,244,207,136,140,245,
207,120,141,20,1984                         KL
•150 DATA3,142,21,3,88,96,165,209,133,253
,165,210,1488                               NO
•160 DATA24,105,212,133,254,165,251,166,2
03,134,251,224,2122                         AI
•170 DATA3,144,55,224,7,176,51,197,251,24
```

```
0,44,165,1557                                  IL
•180 DATA199,208,40,165,212,208,36,165,21
6,208,32,189,1878                              OI
•190 DATA240,207,168,200,173,141,2,201,1,
208,2,136,1679                                 OA
•200 DATA136,152,157,240,207,160,0,224,3,
240,5,200,1724                                 ON
•210 DATA224,6,208,31,153,32,208,108,240,
207,173,0,1590                                 AI
•220 DATA2,240,7,165,204,208,244,141,0,2,
173,146,1532                                   CP
•230 DATA2,208,236,165,209,197,252,240,22
,133,252,173,2089                              DP
•240 DATA245,207,162,0,157,0,216,157,0,21
7,157,0,1518                                   EP
•250 DATA218,157,0,219,232,208,241,174,24
5,207,160,255,2316                             FD
•260 DATA200,192,40,176,19,177,209,16,3,5
6,233,128,1449                                 KC
•270 DATA201,32,,240,240,201,48,144,7,201,
58,176,3,1551                                  HP
•280 DATA174,244,207,138,141,134,2,164,21
3,48,5,145,1615                                OI
•290 DATA253,136,16,251,108,240,207,0,0,0
,0,0,1211                                      KF
```

METEOR RUN

FROM PAGE 31

Beginning address in hex: C000
Ending address in hex: C7C1
SYS to start: 49152

```
C000: A0 00 B9 B1 C6 99 00 3E AA
C008: C8 C0 D2 90 F5 A9 00 99 2E
C010: 00 3E C8 D0 FA 99 00 3F BB
C018: C8 D0 FA B9 83 C7 99 40 8B
C020: 3F B9 98 C7 99 80 3F B9 8C
C028: AD C7 99 C0 3F C8 C0 15 D5
C030: 90 E9 A0 18 A9 2A 99 0D DD
C038: 3F 88 88 88 10 F8 A9 00 C3
C040: 8D 21 D0 A9 09 8D 20 D0 F0
C048: A9 0C 8D 26 D0 A9 0F 8D C8
C050: 25 D0 A9 0A A0 C6 20 1E 9F
C058: AB A2 13 A0 00 18 20 F0 83
C060: FF A9 53 A0 C6 20 1E AB AE
C068: A0 27 A9 C5 20 D2 FF 88 1B
C070: 10 FA A9 0E A0 C6 20 1E D8
C078: AB A0 09 A9 02 99 A0 DB 8F
C080: A9 07 99 AA DB A9 05 99 99
C088: B4 DB 88 10 EE A0 18 B9 13
C090: F1 C5 99 00 D4 88 10 F7 47
C098: A0 FB 8C FE 07 C8 8C FF 1D
C0A0: 07 A9 BF 8D 1C D0 A9 80 B5
C0A8: 8D 17 D0 A9 02 8D 27 D0 4F
C0B0: A9 07 8D 2D D0 78 A9 7F 8E
C0B8: 8D 0D DC A9 01 8D 1A D0 53
C0C0: 8D 12 D0 A9 1B 8D 11 D0 65
C0C8: A9 8A 8D 14 03 A9 C4 8D 9D
C0D0: 15 03 58 20 F8 C3 A9 33 FA
C0D8: 8D 87 07 A0 04 8C 96 C5 82
C0E0: A9 06 99 28 D0 98 0A AA 70
C0E8: A9 00 99 C2 C5 9D 03 D0 26
C0F0: 88 10 ED 8C 93 C5 C8 8C B2
C0F8: 92 C5 84 FC A9 B0 8D 00 BA
C100: D0 A9 2B 8D 01 D0 A9 FE AD
C108: 8D F8 07 AD 15 D0 09 BF F1
C110: 8D 15 D0 A9 1E 20 15 C3 44
C118: A0 28 EE 01 D0 A2 01 20 65
C120: 51 C3 88 D0 F5 AD 1E D0 21
C128: AD 1F D0 AD 8D 02 F0 08 FB
C130: A9 00 8D 92 C5 4C 2B C1 F8
C138: AD 00 DC AA 29 10 85 FD 2A
C140: 8A 29 03 A8 18 B9 9D C5 D4
C148: 6D 01 D0 C9 34 90 07 C9 E6
C150: C2 B0 03 8D 01 D0 AC 96 69
C158: C5 8A 29 0C 49 0C 4A 4A C7
C160: AA 18 AD 95 C5 7D 97 C5 07
C168: 8D 95 C5 98 7D 9A C5 C9 91
C170: 09 B0 04 8D 96 C5 A8 A2 63
C178: FD C0 04 90 06 E8 C0 04 7F
C180: F0 01 E8 8E F8 07 18 B9 BB
C188: AA C5 6D 00 D0 C9 97 90 29
C190: 0C C9 C9 B0 08 8D 00 D0 47
C198: 8D 0E D0 A2 00 8E 92 C5 8E
C1A0: A5 FC D0 2C A5 FD D0 2B DF
C1A8: AD 01 D0 C9 C0 90 10 8D E0
C1B0: 0F D0 EE 2E D0 A9 19 A2 E3
C1B8: 14 20 C0 C3 4C D3 C1 AD 01
C1C0: F8 07 C9 FE F0 0D AC 94 C8
C1C8: C5 C0 0B 90 06 20 5B C3 30
C1D0: 20 3A C3 A2 10 A0 00 C8 0B
C1D8: D0 FD CA D0 FA 8E 0F D0 AC
C1E0: AD 1F D0 29 3E F0 2E 85 8A
C1E8: FB A0 06 06 FB 90 20 A9 E7
C1F0: FA 99 F9 07 A2 40 8E 04 FB
C1F8: D4 E8 8E 04 D4 A2 03 20 E3
C200: 51 C3 8A 99 C2 C5 98 48 A2
C208: A2 05 20 CB C3 68 A8 88 F8
C210: 10 D9 AD 1F D0 A0 04 B9 F5
C218: C2 C5 D0 1E B9 CE C5 29 07
C220: 01 F0 17 B9 C8 C5 10 12 93
C228: C9 EB B0 0E AD 1B D4 29 63
C230: 01 09 F8 99 F9 07 4A 99 B1
C238: C2 C5 88 10 DA AD D3 C5 7B
C240: 4A A8 A2 BF B9 3C 03 F0 7F
C248: 02 A2 FF 8E 15 D0 AD 1E 2D
C250: D0 29 41 D0 03 4C E3 C2 52
C258: 85 FB 29 40 F0 24 AD D3 D9
C260: C5 4A A8 B9 3C 03 F0 1A 1D
C268: A9 00 99 3C 03 18 AD 94 45
C270: C5 69 0A 8D 94 C5 A9 BF FA
C278: 8D 15 D0 C6 FE D0 03 20 A5
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C280: 24 C4 A5 FB 29 01 F0 58 7E
C288: A9 FA 8D F8 07 A2 40 8E 2C
C290: 04 D4 E8 8E 04 D4 A2 03 5F
C298: 20 51 C3 8E 92 C5 8E 01 44
C2A0: D0 CE 87 07 A5 FC F0 03 65
C2A8: 20 3A C3 A0 04 B9 CE C5 B9
C2B0: 29 01 F0 12 B9 C8 C5 10 36
C2B8: 0D C9 EB B0 09 AD 15 D0 C8
C2C0: 39 E5 C5 8D 15 D0 88 10 B1
C2C8: E4 AD 15 D0 29 3E D0 DB 55
C2D0: AD 87 07 29 0F D0 06 20 3C
C2D8: 55 C4 4C D3 C0 4C DB C0 BC
C2E0: AD 1E D0 20 E9 C2 4C 2B C1
C2E8: C1 AC 96 C5 38 AD 93 C5 F2
C2F0: F9 A1 C5 A8 AD 94 C5 E9 EC
C2F8: 00 F0 35 AA A5 FD 49 10 C6
C300: 4A 85 FB 38 98 E5 FB 8D 0C
C308: 93 C5 8A E9 00 F0 21 C9 B1
C310: 1F 90 02 A9 1E 8D 94 C5 71
C318: A2 00 A9 D0 9D A0 07 E8 63
C320: EC 94 C5 90 F7 A9 20 9D 57
C328: A0 07 E8 E0 1E 90 F8 60 A1
C330: A9 20 8D A0 07 68 68 4C 4C
C338: 88 C2 AC BC C5 AE BD C5 E4
C340: BD BE C5 51 02 91 02 A5 0F
C348: A2 91 04 88 10 F2 C6 FC CF
C350: 60 A5 A2 C5 A2 F0 FC CA 1A
C358: D0 F7 60 A9 01 85 02 A9 5D
C360: 04 85 03 38 AD 01 D0 E9 8E
C368: 2D 48 29 07 4A 8D BD C5 69
C370: 68 4A 4A 4A A8 F0 0E 18 77
C378: A5 02 69 28 85 02 90 02 CB
C380: E6 03 88 D0 F2 38 AD 00 9C
C388: D0 E9 28 4A 4A 4A AC F8 EF
C390: 07 C0 FD F0 15 18 69 04 E1
C398: 8D BC C5 18 65 02 85 02 AF
C3A0: 90 02 E6 03 38 A9 24 ED 11
C3A8: BC C5 8D BC C5 A5 02 85 68
C3B0: 04 A5 03 18 69 D4 85 05 3E
C3B8: A9 02 85 FC A9 16 A2 42 8B
C3C0: 8D 08 D4 8E 0B D4 E8 8E 11
C3C8: 0B D4 60 AD 7A 07 48 A0 21
C3D0: 04 38 B9 78 07 69 00 C9 79
C3D8: 3A 90 02 A9 30 99 78 07 98
C3E0: 88 10 EF CA D0 E9 68 CD 25
C3E8: 7A 07 F0 0B AC 87 07 C8 6A
C3F0: C0 3A B0 03 8C 87 07 60 1B
C3F8: A0 00 B9 78 07 D9 90 07 44
C400: F0 05 B0 0B 4C 1A C4 C8 A5
C408: C0 06 90 EE 4C 1A C4 A0 1A
C410: 05 B9 78 07 99 90 07 88 08
C418: 10 F7 A0 05 A9 30 99 78 B1
C420: 07 88 10 FA A0 00 98 29 1D
C428: 03 C9 01 F0 02 A9 00 99 2C
C430: 3C 03 C8 10 F1 8C CD C5 5A
C438: A9 01 8D D3 C5 A0 20 84 4F
C440: FE AD 1B D4 29 7F AA BD ED
C448: 3C 03 D0 05 FE 3C 03 E6 8[illegible]
C450: FE 88 10 ED 60 CE 86 02 8D
C458: AD 86 02 29 03 09 0C 8D 5D
C460: 08 D4 A2 42 8E 0B D4 E8 79
C468: 8E 0B D4 A2 0A A0 0E 18 4A
C470: 20 F0 FF A9 45 A0 C6 20 F7
C478: 1E AB A2 0E 20 51 C3 A5 CD
C480: CB C9 40 F0 D0 A2 0A 4C 11
C488: FF E9 A2 01 8E 19 D0 A9 38
C490: C0 AC 12 D0 30 5F AC 92 AF
C498: C5 F0 53 AC 96 C5 38 AD 91
C4A0: 91 C5 F9 AA C5 AA 29 07 3D
C4A8: 8D 91 C5 8A 30 1D C9 08 37
C4B0: 90 3C AD 1F 07 85 A7 AD 2C
C4B8: 47 07 85 A8 A0 4E B9 F8 D6
C4C0: 06 99 F9 06 88 10 F7 C8 B9
C4C8: 4C E4 C4 AD F8 06 85 A7 98
C4D0: AD 20 07 85 A8 A0 00 B9 2E
C4D8: F9 06 99 F8 06 C8 C0 4F 4A
C4E0: 90 F5 A0 27 A5 A7 99 F8 0F
C4E8: 06 A5 A8 99 20 07 A2 DE 7F
C4F0: A9 C0 0D 91 C5 8E 12 D0 31
C4F8: 8D 16 D0 E0 DE D0 03 4C 4D
C500: 84 C5 AD 8D 02 D0 F8 A2 F3
C508: 04 BD C2 C5 F0 1B 18 7D F3
C510: D4 C5 C9 BA B0 04 C9 0C B9
C518: B0 0C 38 A9 00 FD D4 C5 4F
C520: 9D D4 C5 4C 29 C5 9D C2 F3
C528: C5 CA 10 DD A2 05 18 BD 24
C530: C8 C5 7D D9 C5 9D C8 C5 08
C538: BD CE C5 7D DF C5 9D CE 1A
C540: C5 AC 92 C5 F0 16 AC 96 55
C548: C5 38 BD C8 C5 F9 AA C5 FC
C550: 9D C8 C5 BD CE C5 F9 B3 7C
C558: C5 9D CE C5 8A 0A A8 BD 4B
C560: C2 C5 99 03 D0 BD C8 C5 A2
C568: 99 02 D0 AD 10 D0 3D E5 86
C570: C5 A8 BD CE C5 29 01 F0 4C
C578: 05 98 1D EB C5 A8 8C 10 2A
C580: D0 CA 10 AA AD 0D DC 29 97
C588: 01 F0 03 4C 31 EA 4C BC EE
C590: FE 00 00 00 00 00 04 00 93
C598: CD 32 00 FF 00 00 02 FE 99
C5A0: 00 05 04 03 02 01 02 03 B4
C5A8: 04 05 FC FD FE FF 00 01 AC
C5B0: 02 03 04 FF FF FF FF 00 B9
C5B8: 00 00 00 00 00 00 57 65 75
C5C0: 63 72 00 00 00 00 00 D4 6B
C5C8: 00 00 00 00 00 DC 01 01 A7
C5D0: 01 01 01 01 01 FF 01 FF D6
C5D8: 01 01 FE 02 FD 03 00 00 DC
C5E0: FF 00 FF 00 00 FD FB F7 D2
C5E8: EF DF BF 02 04 08 10 20 B6
C5F0: 40 FB 04 60 33 00 0A 00 CE
C5F8: 33 16 A0 51 42 0A 00 00 80
C600: FF 00 00 80 00 00 00 2A AA
C608: F2 AF 8E 08 93 00 20 20 15
C610: 9C 53 43 4F 52 45 20 05 4F
C618: 30 30 30 30 30 30 20 20 79
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C620: 20 9F 53 48 49 50 53 20 88
C628: 05 33 20 20 20 96 48 49 E8
C630: 47 48 20 05 30 30 30 30 A5
C638: 30 30 20 20 20 20 99 50 03
C640: 4F 57 45 52 00 50 52 45 66
C648: 53 53 20 41 4E 59 20 4B 63
C650: 45 59 00 97 20 20 20 B9 A0
C658: 12 B7 BC B8 92 AF 20 20 1A
C660: 20 20 20 A4 20 AC B9 A2 8E
C668: AF 20 20 20 20 AF B9 BB BD
C670: AF 20 20 20 20 20 20 AC 8D
C678: 12 B8 92 AF B9 20 20 20 9F
C680: A4 AF 12 BE 20 20 20 20 26
C688: 20 20 92 A2 AF 12 BE A3 22
C690: 20 A3 20 20 20 20 B7 B8 45
C698: 92 B9 12 A3 20 20 20 20 1B
C6A0: 20 92 A2 A4 AF B9 A2 12 B8
C6A8: 20 20 20 20 20 92 A2 B9 38
C6B0: 1F 00 00 00 00 26 00 01 F6
C6B8: 55 80 06 79 40 09 EA 68 AA
C6C0: 29 ED 38 2B 55 AC 23 97 F7
C6C8: CC 3B 9F B8 07 EF B8 28 01
C6D0: AD E8 29 2E E8 0B D2 A0 26
C6D8: 08 EA 80 02 AA 80 00 A8 22
C6E0: 00 00 00 00 00 00 00 00 E0
C6E8: 00 00 00 00 00 00 00 00 E8
C6F0: 00 00 00 00 00 00 00 00 F0
C6F8: 00 00 00 15 80 00 5B 60 4A
C700: 01 6A E0 01 1E D8 0E A5 F7
C708: 78 04 E5 B8 0B BD A8 0B 9F
C710: 2E E8 02 9C A0 02 A2 A0 AB
C718: 00 AA 80 00 2A 00 00 00 6D
C720: 00 00 00 00 00 00 00 00 20
C728: 00 00 00 00 00 00 00 00 28
C730: 00 00 03 00 00 C0 08 18 14
C738: 02 00 00 00 00 00 20 04 5E
C740: 10 0C 80 00 62 00 80 80 40
C748: 81 03 8D 10 00 30 40 23 FD
C750: 0C 8C 00 21 00 00 00 82 8C
C758: C2 00 00 00 04 00 20 00 3F
C760: 8C 00 20 00 00 00 C0 00 CD
C768: 00 00 00 00 00 00 00 00 68
C770: 49 00 0C 00 00 36 00 00 FB
C778: DF 80 03 FD C0 0D 77 70 8F
C780: 1E FF BC 00 00 55 00 01 B1
C788: 78 00 05 E0 2A 57 E0 A3 EC
C790: FF 80 7F C3 A0 BF 15 58 22
C798: 00 04 00 00 0C 00 00 3F E7
C7A0: 00 00 EA C0 05 48 54 17 05
C7A8: D5 F5 10 15 01 55 00 00 EF
C7B0: 2D 40 00 0B 50 00 0B D5 5A
C7B8: A8 02 FF CA 0A C3 FD 25 1F
C7C0: 54 FE 14
```

TRIM

FROM PAGE 64

```
•10 REM *** TRIM *** BUCK CHILDRESS * SAL
EM, OR 97309 * (3/31/86)                 NN
•20 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=50000:L=80:C=11             OE
•30 PRINTCHR$(19)TAB(31)L:PRINT          IM
•40 FORB=0TOC:READA:POKEJ+B,A:X=X+A:NEXTB
:READA                                   FE
•50 IFX<>ATHENPRINT"ERROR IN DATA LINE:"L
:END                                     AD
•60 X=0:J=J+12:L=L+10:IFL<580THEN30      AO
•70 PRINT"DATA OK AND LOADED[3"."]":PRINT
:PRINT"SYS 5[4"0"] TO ACTIVATE[3"."]":EN
D                                        EI
•80 DATA32,220,196,141,176,197,141,177,19
7,162,10,238,1887                        PF
•90 DATA176,197,32,252,196,224,48,176,5,1
62,61,32,1561                            CA
•100 DATA252,196,32,225,255,208,3,76,220,
196,32,228,1923                          BJ
•110 DATA255,201,20,240,215,201,78,240,4,
201,89,208,1952                          FK
•120 DATA233,174,176,197,224,3,144,22,201
,78,240,196,1888                         CL
•130 DATA174,177,197,208,57,162,71,32,252
,196,32,228,1786                         HF
•140 DATA255,240,251,76,80,195,32,210,255
,201,78,208,2081                         IA
•150 DATA8,169,79,32,210,255,76,188,195,1
62,24,32,1430                            EI
•160 DATA252,196,173,176,197,24,109,177,1
97,141,177,197,2016                      IA
•170 DATA162,27,173,176,197,201,1,240,150
,162,44,76,1609                          JO
•180 DATA91,195,169,1,162,8,133,251,133,2
53,134,252,1782                          MK
•190 DATA134,254,32,220,196,160,178,153,0
,197,200,208,1932                        CD
•200 DATA250,165,253,166,254,133,251,134,
252,32,213,196,2299                      HE
•210 DATA177,251,208,3,76,220,196,32,213,
196,177,251,2000                         NK
•220 DATA170,32,213,196,177,251,32,205,18
9,169,32,32,1698                         PH
•230 DATA210,255,32,213,196,162,0,161,251
,208,3,76,1767                           PC
•240 DATA148,196,174,178,197,224,143,240,
55,166,212,208,2141                      KA
•250 DATA54,174,177,197,224,2,240,4,201,3
2,240,37,1582                            GA
•260 DATA224,2,144,39,201,143,208,35,174,
179,197,208,1754                         IK
```

```
·270 DATA8,141,178,197,169,58,76,83,196,2
 24,58,208,1596                          LI
·280 DATA12,174,180,197,240,7,169,20,32,2
 10,255,169,1665                         FM
·290 DATA143,141,178,197,76,142,196,141,1
 79,197,201,58,1849                      EF
·300 DATA240,3,141,180,197,201,128,144,39
 ,166,212,208,1859                       DA
·310 DATA35,56,233,127,170,160,255,202,24
 0,8,200,185,1871                        HK
·320 DATA158,160,16,250,48,245,200,185,15
 8,160,48,9,1637                         DD
·330 DATA32,234,196,32,210,255,76,118,196
 ,56,233,128,1766                        AO
·340 DATA32,234,196,32,210,255,32,213,196
 ,76,9,196,1681                          JB
·350 DATA32,225,255,240,67,32,223,196,32,
 213,196,173,1884                        FB
·360 DATA178,197,208,11,165,251,166,252,1
 33,253,134,254,2202                     IF
·370 DATA76,214,195,173,182,197,240,5,162
 ,137,76,252,1909                        FB
·380 DATA196,162,0,32,252,196,169,19,141,
 119,2,169,1457                          FD
·390 DATA13,141,120,2,141,121,2,141,122,2
 ,169,4,978                              KO
·400 DATA133,198,76,49,168,230,251,208,2,
 230,252,96,1893                         NL
·410 DATA32,68,229,169,0,133,198,133,199,
 133,212,133,1639                        IM
·420 DATA216,96,174,181,197,240,3,142,182
 ,197,166,211,2005                       JE
·430 DATA224,79,144,3,142,181,197,96,189,
 8,197,240,1700                          PM
·440 DATA250,32,210,255,232,76,252,196,13
 ,83,89,83,1771                          JJ
·450 DATA53,48,49,51,52,0,13,13,68,69,76,
 69,561                                  BJ
·460 DATA84,69,32,32,83,80,65,67,69,83,0,
 13,677                                  FO
·470 DATA13,68,69,76,69,84,69,32,82,69,77
 ,65,773                                 AG
·480 DATA82,75,83,0,13,13,18,32,32,65,82,
 69,564                                  ID
·490 DATA32,89,79,85,32,83,85,82,69,63,32
 ,40,771                                 NE
·500 DATA89,47,78,41,32,32,0,13,13,89,79,
 85,598                                  OO
·510 DATA32,77,85,83,84,32,65,78,83,87,69
 ,82,857                                 KJ
·520 DATA32,89,69,83,32,84,79,32,65,84,32
 ,76,757                                 JE
·530 DATA69,65,83,84,13,79,78,69,32,80,82
 ,79,813                                 HM
·540 DATA77,80,84,46,46,46,46,46,32,40,80
 ,82,705                                 DL
·550 DATA69,83,83,32,65,78,89,32,75,69,89
 ,41,805                                 LO
·560 DATA0,13,13,18,76,73,78,69,32,84,79,
 79,614                                  JA
·570 DATA32,76,79,78,71,13,0,0,0,0,0,0,34
 9                                       ME
```

DISK CATALOGER
FROM PAGE 71

Beginning address in hex: C000
Ending address in hex: CF10
SYS to start: 49152
Flankspeed **required for entry! See page 85.**

```
C000: A9 0F 8D 20 D0 A9 01 8D 6F
C008: 21 D0 20 3E C9 20 5E C9 6A
C010: A0 05 A9 00 91 A5 88 10 2F
C018: FB A9 40 8D 8A 02 20 E4 1D
C020: C8 20 E5 C5 20 A9 C0 20 5F
C028: E4 FF C9 52 F0 24 C9 50 58
C030: F0 53 C9 48 F0 55 C9 4C E2
C038: F0 5D C9 53 F0 53 C9 44 F5
C040: F0 5B C9 46 F0 5D C9 51 06
C048: D0 DD A9 00 8D 8A 02 4C 07
C050: E2 FC 20 65 C2 20 F9 C0 53
C058: AD 10 CF C9 A0 F0 10 B0 02
C060: 0E 20 F3 C2 AD 0C CF F0 BF
C068: 03 20 32 C7 4C 21 C0 20 D3
C070: E5 C5 20 36 C6 A2 9D A0 1A
C078: CC 20 2D C9 20 3C C6 20 9F
C080: A7 C5 4C 21 C0 20 29 C5 2B
C088: 4C 21 C0 20 3D C1 4C 21 43
C090: C0 20 F5 C7 4C 21 C0 20 7D
C098: 6D C8 4C 21 C0 20 34 C4 16
C0A0: 4C 21 C0 20 BC C4 4C 21 DD
C0A8: C0 20 33 C6 A2 6D A0 CD 02
C0B0: 20 2D C9 20 36 C6 A2 8E 16
C0B8: A0 CD 20 2D C9 20 39 C6 5E
C0C0: A2 AF A0 CD 20 2D C9 20 B8
C0C8: 3C C6 A2 D0 A0 CD 20 2D FA
C0D0: C9 20 3F C6 A2 F1 A0 CD C3
C0D8: 20 2D C9 20 42 C6 A2 12 CD
C0E0: A0 CE 20 2D C9 20 45 C6 93
C0E8: A2 33 A0 CE 20 2D C9 20 65
C0F0: 48 C6 A2 54 A0 CE 4C 2D DF
C0F8: C9 AC 0A CF 8C 0F CF AC 61
C100: 0B CF 8C 10 CF 20 24 C9 55
C108: A0 00 B1 FD F0 06 20 1D 8C
C110: C9 4C 08 C1 20 21 C1 20 13
C118: 1D C9 A0 00 B1 FD D0 E8 09
C120: 60 18 AD 0F CF 69 27 8D 43
C128: 0F CF AD 10 CF 69 00 8D 8B
C130: 10 CF 60 20 0B C4 A2 43 46
C138: A0 CD 4C 2D C9 20 33 C1 FE
C140: 20 39 C6 A2 24 A0 CD 20 B5
C148: 2D C9 20 3F C6 20 A7 C5 F2
C150: 20 33 C1 20 E1 C7 AD C6 A3
C158: 11 D0 03 4C 71 C5 20 CC AD
C160: FF A9 7F A2 04 A0 FF 20 F0
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C168: BA FF A9 00 20 BD FF 20 CA
C170: C0 FF A2 7F 20 C9 FF A9 E6
C178: C6 85 A9 A9 11 85 AA A9 03
C180: 00 8D 11 CF A0 00 B1 A9 EA
C188: F0 28 20 C3 C1 A0 32 8C A6
C190: 09 CF A0 00 B1 A9 F0 1A 70
C198: 20 BA C1 20 EF C1 20 86 AD
C1A0: C9 AC 09 CF 88 D0 E8 A0 D2
C1A8: 06 20 86 C9 88 10 FA 4C FE
C1B0: 84 C1 A9 7F 20 C3 FF 4C 50
C1B8: CC FF A0 09 20 81 C9 88 23
C1C0: 10 FA 60 A2 DE A0 CC 20 3B
C1C8: 2D C9 EE 11 CF A9 00 AE E7
C1D0: 11 CF 20 CD BD 20 86 C9 CD
C1D8: 20 86 C9 20 BA C1 A2 A2 2B
C1E0: A0 CB 20 2D C9 20 BA C1 01
C1E8: A2 DD A0 CB 4C 2D C9 A2 BB
C1F0: 12 8E 0F CF A0 00 B1 A9 6C
C1F8: 20 D2 FF 20 37 C2 CE 0F E3
C200: CF D0 F1 20 BA C1 A2 11 E2
C208: 8E 0F CF A0 00 B1 A9 20 91
C210: D2 FF 20 37 C2 CE 0F CF AA
C218: D0 F1 20 BA C1 A0 00 B1 C9
C220: A9 20 D2 FF 20 37 C2 A0 77
C228: 00 B1 A9 20 D2 FF 20 37 CD
C230: C2 20 37 C2 4C 37 C2 E6 3A
C238: A9 D0 02 E6 AA 60 20 0B D1
C240: C4 A9 58 A0 CC 4C 1E AB 8A
C248: 20 3C C6 A9 95 A0 CE 20 3A
C250: 1E AB 4C AE C5 20 39 C6 FA
C258: A9 EA A0 CE 20 1E AB 20 66
C260: 3F C6 4C A7 C5 20 3E C2 41
C268: 20 48 C2 20 3E C2 20 E1 B6
C270: C7 20 69 C6 20 74 C9 20 07
C278: 7A C6 AD 3C 03 C9 30 F0 91
C280: 03 4C DD C2 20 54 C6 20 CB
C288: BE C6 20 24 C9 A0 05 A9 6B
C290: 00 91 FB 88 10 FB 20 CF A2
C298: FF A4 90 D0 0A C9 22 D0 65
C2A0: F5 20 02 C7 4C 96 C2 A9 CF
C2A8: 00 20 2B C7 20 CC FF A9 52
C2B0: 02 20 C3 FF 20 7A C6 20 18
C2B8: B6 C6 AD 3C 03 C9 30 F0 0E
C2C0: 19 20 9F C6 20 E9 C2 20 4D
C2C8: E4 FF C9 59 F0 97 C9 4E 71
C2D0: D0 F5 68 68 20 E7 FF 4C BC
C2D8: 21 C0 4C E7 FF 20 9F C6 75
C2E0: 20 B6 C6 20 E9 C2 4C C7 5F
C2E8: C2 20 42 C6 A2 27 A0 CC 0C
C2F0: 4C 2D C9 20 3E C2 20 BA 30
C2F8: C5 A2 00 8E 0C CF 20 E4 D0
C300: FF C9 4E F0 41 C9 59 D0 3E
C308: F5 20 24 C9 A6 FD 8E 0D 4C
C310: CF A6 FE 8E 0E CF 20 F9 0C
C318: C5 A0 00 B1 FD F0 09 20 48
C320: D2 FF 20 1D C9 4C 19 C3 23
C328: 20 04 C6 20 E4 FF C9 85 67
C330: F0 15 C9 86 F0 07 C9 87 CF
C338: D0 F1 4C 94 C3 20 1D C9 A6
C340: A0 00 B1 FD D0 C6 60 AE 37
C348: 0D CF 86 A3 AE 0E CF 86 62
C350: A4 20 F9 C3 A0 00 B1 A3 C8
C358: F0 06 99 15 CF C8 D0 F6 5E
C360: A0 00 B9 3D CF 99 27 CF 58
C368: C8 C0 13 D0 F5 A9 00 8D 03
C370: 3B CF 20 69 C9 A2 00 A0 12
C378: 00 BD 15 CF 91 A5 20 50 C2
C380: C9 E8 E0 27 D0 F3 8E 0C 9A
C388: CF A9 00 A8 91 A5 20 5E 60
C390: C9 4C 3D C3 20 22 C6 20 D0
C398: 42 C6 20 04 C4 20 BC C3 2B
C3A0: AD 09 CF F0 EF 20 48 C6 37
C3A8: 20 18 C4 20 E4 FF C9 59 CD
C3B0: F0 07 C9 4E D0 F5 4C 94 68
C3B8: C3 4C 60 C3 20 F9 C3 A0 6B
C3C0: 00 8C 09 CF 20 E4 FF C9 F4
C3C8: 0D F0 1C C9 14 F0 19 C9 94
C3D0: 20 90 F1 C9 5E B0 ED 48 82
C3D8: 20 D2 FF 68 AC 09 CF 99 53
C3E0: 15 CF C8 C0 10 D0 DA 60 6B
C3E8: A9 14 20 D2 FF AC 09 CF 1F
C3F0: 88 A9 20 99 15 CF 4C C1 CF
C3F8: C3 A0 27 A9 20 99 15 CF CC
C400: 88 10 FA 60 A2 B5 A0 CC B9
C408: 4C 2D C9 20 E5 C5 20 33 6A
C410: C6 A9 89 A0 CE 4C 1E AB 8F
C418: A2 03 A0 CA 4C 2D C9 A2 0F
C420: 1D A0 CA 4C 2D C9 A2 F3 82
C428: A0 C9 4C 2D C9 A2 2D A0 46
C430: CA 4C 2D C9 AD C6 11 D0 94
C438: 03 4C 71 C5 20 0B C4 A2 51
C440: 75 A0 CE 20 2D C9 20 39 95
C448: C6 20 1F C4 20 BC C3 20 D3
C450: 3F C6 20 18 C4 20 E4 FF 58
C458: C9 4E F0 D8 C9 59 D0 F5 24
C460: 20 8C C4 90 26 A0 00 B1 DA
C468: B0 D0 0E 98 91 AE A4 AE 24
C470: 8C 0A CF A4 AF 8C 0B CF 92
C478: 60 A0 26 B1 B0 91 AE 88 CA
C480: 10 F9 20 C6 C7 20 B8 C7 D9
C488: 4C 65 C4 60 20 D4 C7 4C 68
C490: 95 C4 20 C6 C7 20 B8 C7 3A
C498: A0 00 B1 B0 F0 0E A0 0F 4A
C4A0: B9 15 CF D1 AE D0 EB 88 05
C4A8: 10 F6 38 60 A0 0F B9 15 C6
C4B0: CF D1 AE D0 05 88 10 F6 66
C4B8: 38 60 18 60 20 0B C4 A2 5C
C4C0: BB A0 CE 20 2D C9 AD C6 77
C4C8: 11 D0 03 4C 71 C5 20 3C 8D
C4D0: C6 20 1F C4 20 BC C3 20 5C
C4D8: 42 C6 20 18 C4 20 E4 FF E3
C4E0: C9 4E F0 D8 C9 59 D0 F5 AC
C4E8: A2 0F 20 FF E9 20 8C C4 16
C4F0: 90 27 20 42 C6 20 26 C4 DC
C4F8: A0 12 B1 AE 20 D2 FF C8 C7
C500: C0 23 D0 F6 20 45 C6 20 F7
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C508: 2D C4 A0 23 B1 AE 20 D2 11
C510: FF C8 C0 26 D0 F6 4C A4 78
C518: C5 20 42 C6 A2 D3 A0 CE EC
C520: 20 2D C9 20 48 C6 4C A7 5A
C528: C5 20 3E C9 A0 00 B1 A5 0E
C530: F0 3F 20 E5 C5 20 81 C9 97
C538: 20 96 C5 20 86 C9 20 81 C6
C540: C9 20 9D C5 20 86 C9 A0 9E
C548: 0F 8C 09 CF A0 00 B1 A5 B4
C550: F0 1B 20 81 C9 20 84 C5 32
C558: 20 86 C9 AC 09 CF 88 10 E6
C560: E8 20 A4 C5 A0 00 B1 A5 CB
C568: F0 06 4C 32 C5 20 A4 C5 2E
C570: 60 20 E5 C5 20 36 C6 A2 5C
C578: 83 A0 CC 20 2D C9 20 3C DC
C580: C6 4C A7 C5 A0 00 B1 A5 F8
C588: F0 09 20 D2 FF 20 50 C9 AF
C590: 4C 84 C5 4C 50 C9 A2 56 86
C598: A0 CB 4C 2D C9 A2 7C A0 08
C5A0: CB 4C 2D C9 20 4B C6 A2 84
C5A8: 38 A0 CC 20 2D C9 20 E4 6A
C5B0: FF C9 0D D0 F9 A2 17 4C 58
C5B8: FF E9 20 36 C6 20 26 C4 CA
C5C0: A0 00 B9 3D CF 20 D2 FF 1B
C5C8: C8 C0 10 D0 F5 20 39 C6 49
C5D0: 20 2D C4 AD 4E CF 20 D2 A1
C5D8: FF AD 4F CF 20 D2 FF 20 B8
C5E0: 3C C6 4C 18 C4 AD 18 D0 A3
C5E8: 29 F8 09 04 8D 18 D0 20 AE
C5F0: 08 C9 A9 9C A0 C9 4C 1E DD
C5F8: AB A2 0B 20 FF E9 20 3C B8
C600: C6 4C 1F C4 20 08 C9 20 09
C608: 22 C6 20 42 C6 A2 3D A0 9A
C610: CA 20 2D C9 A2 B3 A0 CA B3
C618: 20 2D C9 A2 05 A0 CB 4C 8F
C620: 2D C9 A0 77 A9 20 99 58 EA
C628: 06 99 D0 06 99 20 07 88 E7
C630: 10 F4 60 A9 05 2C A9 07 21
C638: 2C A9 09 2C A9 0B 2C A9 CD
C640: 0D 2C A9 0F 2C A9 11 2C 45
C648: A9 13 2C A9 17 AA A0 04 41
C650: 18 4C F0 FF A9 02 A2 08 FB
C658: A0 00 20 BA FF A9 02 A2 22
C660: 8B A0 C9 20 BD FF 4C C0 41
C668: FF A9 0F A0 0F A2 08 20 9B
C670: BA FF A9 00 20 BD FF 4C FE
C678: C0 FF 20 CC FF A2 0F 20 F7
C680: C6 FF A0 00 8C 09 CF 20 6D
C688: CF FF C9 0D F0 09 AC 09 DE
C690: CF 99 3C 03 C8 D0 ED A9 6A
C698: 00 99 3C 03 4C CC FF 20 AA
C6A0: E5 C5 20 36 C6 A2 18 A0 C4
C6A8: CC 20 2D C9 20 39 C6 A2 4F
C6B0: 3C A0 03 4C 2D C9 20 CC C0
C6B8: FF A9 0F 4C C3 FF 20 CC 6E
C6C0: FF A2 02 20 C6 FF 20 CF 3C
C6C8: FF C9 22 D0 F9 A0 13 A9 DC
C6D0: 20 99 3D CF 88 10 FA C8 F3
C6D8: 20 CF FF C9 22 F0 0E C9 7D
C6E0: 20 90 F5 C9 5C B0 F1 99 E9
C6E8: 3D CF C8 D0 EB 20 CF FF 6B
C6F0: 20 CF FF 8D 4E CF 20 CF 7C
C6F8: FF 8D 4F CF A0 00 8C 50 23
C700: CF 60 A4 FD 8C 07 CF A4 DA
C708: FE 8C 08 CF 20 CF FF C9 25
C710: 22 F0 16 C9 0D F0 12 C9 DC
C718: 00 F0 0E C9 20 90 ED C9 49
C720: 5C B0 E9 20 2B C7 4C 0C 82
C728: C7 A9 00 A0 00 91 FD 4C 16
C730: 1D C9 20 0B C4 A2 C9 A0 14
C738: CC 20 2D C9 A0 00 8C 0F 58
C740: CF 8C 10 CF 20 D4 C7 20 59
C748: C6 C7 A0 00 B1 AE F0 3F 08
C750: 20 3C C6 A2 D6 A0 CC 20 7A
C758: 2D C9 EE 0F CF D0 03 EE DF
C760: 10 CF AE 0F CF AD 10 CF 5B
C768: 20 CD BD 20 D4 C7 AD C6 45
C770: 11 F0 1C 20 C6 C7 A2 00 DF
C778: 8E 13 CF 20 90 C7 20 B8 3B
C780: C7 20 C6 C7 A0 00 B1 AE F7
C788: D0 F1 AD 13 CF D0 C1 60 CE
C790: A0 00 B1 AE D1 B0 F0 03 08
C798: 90 07 60 C8 C0 10 D0 F2 ED
C7A0: 60 A0 26 B1 AE 99 15 CF A6
C7A8: B1 B0 91 AE B9 15 CF 91 7B
C7B0: B0 88 10 EF 8C 13 CF 60 B9
C7B8: 18 A5 B0 69 27 85 B0 A5 93
C7C0: B1 69 00 85 B1 60 18 A5 31
C7C8: AE 69 27 85 AE A5 AF 69 FA
C7D0: 00 85 AF 60 A0 C6 84 B0 03
C7D8: 84 AE A0 11 84 B1 84 AF 28
C7E0: 60 20 3C C6 A9 6A A0 CC E5
C7E8: 4C 1E AB 20 0B C4 A2 54 E5
C7F0: A0 CD 4C 2D C9 20 EB C7 76
C7F8: 20 55 C2 20 EB C7 20 E1 07
C800: C7 AD C6 11 D0 03 4C 71 DE
C808: C5 20 69 C6 A9 0B A2 91 07
C810: A0 C9 20 BD FF 20 D5 C8 17
C818: AD 3C 03 C9 30 D0 38 20 28
C820: CC FF A2 03 20 C9 FF 20 9C
C828: 47 C9 A0 00 B1 AC F0 09 32
C830: 20 D2 FF 20 57 C9 4C 2A DA
C838: C8 20 D2 FF 20 57 C9 A0 D5
C840: 00 B1 AC D0 E5 20 D2 FF 48
C848: A9 FF 20 D2 FF 20 7A C6 46
C850: AD 3C 03 C9 30 F0 73 20 BB
C858: CA C8 20 9F C6 20 3F C6 98
C860: 4C A7 C5 20 0B C4 A2 60 0D
C868: A0 CD 4C 2D C9 20 63 C8 66
C870: 20 55 C2 20 63 C8 20 E1 F6
C878: C7 20 69 C6 A9 04 A2 8D 6E
C880: A0 C9 20 BD FF 20 D5 C8 87
C888: AD 3C 03 C9 30 D0 C8 20 29
C890: CC FF A2 03 20 C6 FF 20 0A
C898: 47 C9 20 CF FF C9 FF F0 54
C8A0: 0A A0 00 91 AC 20 57 C9 CA
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C8A8: 4C 9A C8 A6 AC 8E 0A CF 14
C8B0: A6 AD 8E 0B CF AC 0A CF F4
C8B8: D0 03 CE 0B CF CE 0A CF DE
C8C0: 20 7A C6 AD 3C 03 C9 30 09
C8C8: D0 8D 20 CC FF A9 03 20 E0
C8D0: C3 FF 4C B6 C6 A9 03 A2 AD
C8D8: 08 A0 03 20 BA FF 20 C0 40
C8E0: FF 4C 7A C6 A2 18 A9 00 D2
C8E8: 9D 00 D4 CA 10 FA A9 0F E9
C8F0: 8D 05 D4 A9 F1 8D 06 D4 5C
C8F8: A9 4B 8D 00 D4 A9 3F 8D C6
C900: 01 D4 A2 0F 8E 18 D4 60 63
C908: A9 11 8D 04 D4 A2 32 A0 9E
C910: 00 88 D0 FD CA D0 F8 A9 A5
C918: 10 8D 04 D4 60 E6 FD D0 A4
C920: 02 E6 FE 60 A9 02 85 FD 97
C928: A9 08 85 FE 60 86 FB 84 C5
C930: FC A0 00 B1 FB F0 06 20 92
C938: D2 FF C8 D0 F6 60 A9 C6 6C
C940: 85 A5 A9 11 85 A6 60 A9 5C
C948: C6 85 AC A9 11 85 AD 60 8F
C950: E6 A5 D0 02 E6 A6 60 E6 84
C958: AC D0 02 E6 AD 60 A6 A5 19
C960: 8E 0A CF A6 A6 8E 0B CF 7F
C968: 60 AE 0A CF 86 A5 AE 0B 37
C970: CF 86 A6 60 A2 0F 20 C9 69
C978: FF A9 49 20 D2 FF 4C CC 77
C980: FF A9 20 4C D2 FF A9 0D 20
C988: 4C D2 FF 24 30 46 49 4C D7
C990: 45 40 30 3A 46 49 4C 45 A1
C998: 2C 53 2C 57 93 98 11 20 F8
C9A0: D7 20 20 20 20 20 20 20 59
C9A8: 20 20 20 20 44 49 53 4B 55
C9B0: 20 43 41 54 41 4C 4F 47 CD
C9B8: 45 52 20 20 20 20 20 20 11
C9C0: 20 20 20 20 20 D7 0D 9B E1
C9C8: C3 C3 C3 C3 C3 C3 C3 C3 E6
C9D0: C3 C3 C3 C3 C3 C3 C3 C3 EE
C9D8: C3 C3 C3 C3 C3 C3 C3 C3 F6
C9E0: C3 C3 C3 C3 C3 C3 C3 C3 FE
C9E8: C3 C3 C3 C3 C3 C3 C3 C3 07
C9F0: 98 0D 00 44 49 53 4B 20 E2
C9F8: 4E 41 4D 45 20 20 20 20 9B
CA00: 3A 20 00 4F 2E 4B 2E 20 71
CA08: 54 4F 20 43 4F 4E 54 49 4A
CA10: 4E 55 45 20 97 28 59 2F 61
CA18: 4E 29 98 3F 00 50 52 4F 59
CA20: 47 52 41 4D 20 4E 41 4D 45
CA28: 45 20 3A 20 00 44 49 53 C8
CA30: 4B 20 49 44 20 20 20 20 A9
CA38: 20 20 3A 20 00 9D 98 D5 DE
CA40: C3 C3 C3 C3 C3 C3 C3 C3 5E
CA48: C3 C3 C3 C3 C3 C3 C3 C3 66
CA50: C3 C3 C3 C3 C3 C3 C3 C3 6E
CA58: C3 C3 C3 C3 C3 C3 C3 C3 76
CA60: C9 0D 20 20 20 98 C2 1E 11
CA68: 41 44 44 20 50 52 4F 47 8B
CA70: 52 41 4D 20 4E 41 4D 45 93
CA78: 20 54 4F 20 46 49 4C 45 7D
CA80: 20 20 20 20 5B 46 31 5D 31
CA88: 98 C2 0D 20 20 20 98 C2 AC
CA90: 20 20 20 20 20 20 20 20 91
CA98: 20 20 20 20 20 20 20 20 99
CAA0: 20 20 20 20 20 20 20 20 A1
CAA8: 20 20 20 20 20 20 20 20 A9
CAB0: 98 C2 00 0D 20 20 20 98 12
CAB8: C2 1E 53 4B 49 50 20 54 46
CAC0: 4F 20 4E 45 58 54 20 50 E0
CAC8: 52 4F 47 52 41 4D 20 4E 01
CAD0: 41 4D 45 20 20 20 5B 46 A6
CAD8: 33 5D 98 C2 0D 20 20 20 32
CAE0: 98 C2 20 20 20 20 20 20 FC
CAE8: 20 20 20 20 20 20 20 20 E9
CAF0: 20 20 20 20 20 20 20 20 F1
CAF8: 20 20 20 20 20 20 20 20 F9
CB00: 20 20 98 C2 00 0D 20 20 E8
CB08: 20 98 C2 1E 41 4D 45 4E C3
CB10: 44 20 50 52 4F 47 52 41 41
CB18: 4D 20 4E 41 4D 45 20 20 E7
CB20: 20 20 20 20 20 20 20 20 21
CB28: 5B 46 35 5D 98 C2 0D 20 E4
CB30: 20 20 98 CA C3 C3 C3 C3 E2
CB38: C3 C3 C3 C3 C3 C3 C3 C3 56
CB40: C3 C3 C3 C3 C3 C3 C3 C3 5E
CB48: C3 C3 C3 C3 C3 C3 C3 C3 66
CB50: C3 C3 C3 C3 CB 00 20 20 6B
CB58: 50 52 4F 47 52 41 4D 20 92
CB60: 4E 41 4D 45 20 20 20 20 03
CB68: 20 20 20 44 49 53 4B 20 15
CB70: 4E 41 4D 45 20 20 20 20 13
CB78: 20 49 44 00 C3 C3 C3 C3 35
CB80: C3 C3 C3 C3 C3 C3 C3 C3 9E
CB88: C3 C3 C3 C3 20 20 C3 C3 5F
CB90: C3 C3 C3 C3 C3 C3 C3 C3 AE
CB98: C3 C3 C3 C3 C3 C3 20 C3 13
CBA0: C3 00 20 20 50 52 4F 47 DD
CBA8: 52 41 4D 20 4E 41 4D 45 CB
CBB0: 20 20 20 20 20 20 20 20 B1
CBB8: 20 20 20 20 20 20 20 20 B9
CBC0: 20 20 44 49 53 4B 20 4E 9B
CBC8: 41 4D 45 20 20 20 20 20 3D
CBD0: 20 20 20 20 20 20 20 20 D1
CBD8: 20 49 44 0D 00 3D 3D 3D 4B
CBE0: 3D 3D 3D 3D 3D 3D 3D 3D CA
CBE8: 3D 3D 3D 3D 3D 20 20 20 7B
CBF0: 20 20 20 20 20 20 20 20 F1
CBF8: 20 3D 3D 3D 3D 3D 3D 3D C5
CC00: 3D 3D 3D 3D 3D 3D 3D 3D E9
CC08: 3D 3D 20 20 20 20 20 20 43
CC10: 20 20 20 20 3D 3D 0D 00 18
CC18: 44 49 53 4B 20 45 52 52 4E
CC20: 4F 52 21 21 21 21 00 54 9A
CC28: 52 59 20 41 47 41 49 4E 55
CC30: 20 28 59 2F 4E 29 3F 00 B7
CC38: 50 52 45 53 53 20 97 5B D9
CC40: 52 45 54 55 52 4E 5D 98 18
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CC48: 20 54 4F 20 43 4F 4E 54 61
CC50: 49 4E 55 45 2E 2E 2E 00 0D
CC58: 52 45 41 44 49 4E 47 20 74
CC60: 44 49 52 45 43 54 4F 52 BE
CC68: 59 00 50 4C 45 41 53 45 7D
CC70: 20 57 41 49 54 20 96 2E AB
CC78: 9F 2E 9C 2E 9A 2E 81 2E 89
CC80: 98 2E 00 4E 4F 20 50 52 A7
CC88: 4F 47 52 41 4D 20 4E 41 AF
CC90: 4D 45 53 20 49 4E 20 46 94
CC98: 49 4C 45 21 00 54 4F 4F 87
CCA0: 20 4D 41 4E 59 20 50 52 B9
CCA8: 4F 47 52 41 4D 20 4E 41 CF
CCB0: 4D 45 53 21 00 4E 45 57 A2
CCB8: 20 50 52 4F 47 52 41 4D F2
CCC0: 20 4E 41 4D 45 20 3A 20 7D
CCC8: 00 53 4F 52 54 49 4E 47 F0
CCD0: 20 46 49 4C 45 00 50 41 A3
CCD8: 53 53 20 23 20 00 0D 0D FC
CCE0: 0D 0D 0D 20 20 20 20 20 A8
CCE8: 20 20 20 20 20 44 49 53 6A
CCF0: 4B 20 43 41 54 41 4C 4F 12
CCF8: 47 45 52 20 20 20 20 20 78
CD00: 20 20 20 20 20 20 20 20 01
CD08: 20 20 20 20 20 20 20 20 09
CD10: 20 20 20 20 20 20 20 20 11
CD18: 20 20 20 20 50 41 47 45 B6
CD20: 20 23 20 00 50 4C 45 41 A6
CD28: 53 45 20 4D 41 4B 45 20 20
CD30: 53 55 52 45 20 50 52 49 7C
CD38: 4E 54 45 52 20 49 53 20 4F
CD40: 4F 4E 00 48 41 52 44 43 41
CD48: 4F 50 59 20 4F 46 20 46 5D
CD50: 49 4C 45 00 53 41 56 49 5F
CD58: 4E 47 20 46 49 4C 45 00 2F
CD60: 4C 4F 41 44 49 4E 47 20 80
CD68: 46 49 4C 45 00 52 45 41 62
CD70: 44 20 44 49 52 45 43 54 91
CD78: 4F 52 59 20 2E 2E 2E 2E 4C
CD80: 2E 2E 2E 2E 2E 2E 2E 2E F1
CD88: 2E 2E 5B 52 5D 00 4C 4F 8B
CD90: 41 44 20 46 49 4C 45 20 77
CD98: 2E 2E 2E 2E 2E 2E 2E 2E 0A
CDA0: 2E 2E 2E 2E 2E 2E 2E 2E 12
CDA8: 2E 2E 2E 5B 4C 5D 00 53 8B
CDB0: 41 56 45 20 46 49 4C 45 CE
CDB8: 20 2E 2E 2E 2E 2E 2E 2E 1C
CDC0: 2E 2E 2E 2E 2E 2E 2E 2E 32
CDC8: 2E 2E 2E 2E 5B 53 5D 00 8D
CDD0: 50 52 49 4E 54 20 54 4F 23
CDD8: 20 53 43 52 45 45 4E 20 DA
CDE0: 2E 2E 2E 2E 2E 2E 2E 2E 52
CDE8: 2E 2E 2E 2E 2E 5B 50 5D D8
CDF0: 00 48 41 52 44 43 4F 50 F3
CDF8: 59 20 2E 2E 2E 2E 2E 2E 87
CE00: 2E 2E 2E 2E 2E 2E 2E 2E 71
CE08: 2E 2E 2E 2E 2E 2E 5B 48 C0
CE10: 5D 00 44 45 4C 45 54 45 22
CE18: 20 50 52 4F 47 52 41 4D 52
CE20: 20 4E 41 4D 45 20 2E 2E DE
CE28: 2E 2E 2E 2E 2E 2E 2E 5B C6
CE30: 44 5D 00 46 49 4E 44 20 14
CE38: 50 52 4F 47 52 41 4D 20 72
CE40: 4E 41 4D 45 20 2E 2E 2E 0D
CE48: 2E 2E 2E 2E 2E 2E 2E 2E B9
CE50: 5B 46 5D 00 51 55 49 54 93
CE58: 20 2E 2E 2E 2E 2E 2E 2E BB
CE60: 2E 2E 2E 2E 2E 2E 2E 2E D1
CE68: 2E 2E 2E 2E 2E 2E 2E 2E D9
CE70: 2E 5B 51 5D 00 44 45 4C 7E
CE78: 45 54 45 20 50 52 4F 47 B0
CE80: 52 41 4D 20 4E 41 4D 45 A3
CE88: 00 46 55 4E 43 54 49 4F A2
CE90: 4E 20 3A 20 00 9D 49 4E 8E
CE98: 53 45 52 54 20 49 4E 50 DF
CEA0: 55 54 20 44 49 53 4B 20 B6
CEA8: 2D 20 50 52 45 53 53 20 A4
CEB0: 97 5B 52 45 54 55 52 4E 85
CEB8: 5D 98 00 53 45 41 52 43 1E
CEC0: 48 20 46 4F 52 20 50 52 D3
CEC8: 4F 47 52 41 4D 20 4E 41 EF
CED0: 4D 45 00 50 52 4F 47 52 EE
CED8: 41 4D 20 4E 41 4D 45 20 C9
CEE0: 4E 4F 54 20 46 4F 55 4E 2C
CEE8: 44 00 49 4E 53 45 52 54 04
CEF0: 20 97 53 41 56 45 2F 4C 54
CEF8: 4F 41 44 20 46 49 4C 45 0F
CF00: 98 20 44 49 53 4B 00 00 E4
CF08: 00 00 00 00 00 00 00 00 08
CF10: FF 10
```

FLAP!

FROM PAGE 36

Beginning address in hex: C000
Ending address in hex: CCD3
SYS to start: 49152
***Flankspeed* required for entry! See page 85.**

```
C000: A9 00 8D 86 CB 20 1F CA 93
C008: A9 03 8D 7A CB A9 04 8D C3
C010: 7C CB A9 00 8D 7B CB 8D 64
C018: EF CA 8D F0 CA 8D 24 CB 99
C020: 20 7E C9 A9 93 20 D2 FF B8
C028: A9 00 8D 20 D0 8D 21 D0 CF
C030: A9 0F 8D 27 D0 A9 01 8D A6
C038: 25 D0 A9 07 8D 26 D0 A9 0D
C040: 7F 8D 1C D0 A9 C8 8D F8 33
C048: 07 A9 01 8D 15 D0 A9 CA E1
C050: 8D FF 07 A0 00 A9 64 99 2D
C058: 98 07 A9 0B 99 98 DB C8 83
C060: C0 28 D0 F1 18 A0 00 A2 67
C068: 18 20 F0 FF B9 F1 CA F0 F8
C070: 07 20 D2 FF C8 4C 6C C0 AC
C078: AD 86 CB D0 0B A9 01 8D 8C
C080: 86 CB 20 19 C9 4C 1E C4 05
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

```
C088: A9 B3 8D E7 07 A9 FF 8D 99
C090: 87 CB 8D 8D CB A9 02 8D 04
C098: EE CA 20 51 C9 29 07 CD 8B
C0A0: EE CA F0 F6 8D EE CA 20 A9
C0A8: 19 C9 AD 7B CB F0 03 20 94
C0B0: D2 C8 A9 01 8D 7B CB 20 EB
C0B8: 36 C1 20 FF C0 A9 00 A0 DB
C0C0: 00 99 B6 CA C8 C0 30 D0 66
C0C8: F8 A9 3C 8D 23 CB A9 00 CD
C0D0: 8D 10 D0 A9 AB 8D 00 D0 F2
C0D8: A9 3E 8D 01 D0 A0 01 98 5A
C0E0: 0A AA 20 51 C8 A9 0B 99 1E
C0E8: 27 D0 C8 C0 07 D0 F0 A9 DC
C0F0: 00 85 02 8D EA CA 8D EB 35
C0F8: CA AD 1E D0 4C 3F C1 A9 57
C100: FF 8D 04 DD 8D 05 DD 8D 6D
C108: 06 DD 8D 07 DD A9 41 8D D6
C110: 0F DD A9 01 8D 0E DD 60 81
C118: 38 A9 FF ED 04 DD 85 8B DA
C120: A9 FF ED 05 DD 85 8C A9 56
C128: FF ED 06 DD 85 8D A9 FF B6
C130: ED 07 DD 85 8E 60 A9 00 21
C138: 8D 0E DD 8D 0F DD 60 20 AC
C140: 18 C1 EE E6 CA AD E6 CA 1A
C148: C9 0C 90 05 A9 00 8D E6 D1
C150: CA AD E6 CA 0A 0A A8 A2 D9
C158: 00 38 A5 8B F9 B6 CA A5 E2
C160: 8C F9 B7 CA A5 8D F9 B8 4F
C168: CA 85 4E A5 8E F9 B9 CA B9
C170: 05 4E B0 03 4C 3F C1 A2 67
C178: 00 AD E6 CA 0A 0A A8 18 AC
C180: B9 86 CA 79 B6 CA 99 B6 D6
C188: CA B9 87 CA 79 B7 CA 99 F4
C190: B7 CA B9 88 CA 79 B8 CA 1D
C198: 99 B8 CA B9 89 CA 79 B9 F6
C1A0: CA 99 B9 CA AC E6 CA B9 A1
C1A8: B6 C1 8D B4 C1 B9 C2 C1 63
C1B0: 8D B5 C1 4C 00 C0 CE DC 6E
C1B8: 0A 6F 15 77 B6 F8 67 B8 8E
C1C0: B3 BF C1 C2 C3 C5 C6 C6 CF
C1C8: C6 C6 C7 C7 C8 C8 20 FA 92
C1D0: C8 AD 84 CA F0 19 C9 01 6B
C1D8: D0 07 A9 03 8D E8 CA D0 6F
C1E0: 05 A9 00 8D E8 CA 18 A9 92
C1E8: C8 6D E8 CA 8D F8 07 AD 0E
C1F0: E7 CA F0 16 18 A9 C9 6D A3
C1F8: E8 CA 8D F8 07 20 FA C8 1E
C200: 90 3B A9 00 8D E7 CA 4C 02
C208: 34 C2 20 FA C8 B0 25 A9 62
C210: 01 8D E7 CA A9 00 8D EC 75
C218: CA A5 02 C9 1B 90 04 C9 CD
C220: ED 90 0A 38 A5 02 E9 07 79
C228: 85 02 4C 31 C2 A9 E6 85 06
C230: 02 4C 40 C2 18 AD E8 CA FA
C238: 69 C8 8D F8 07 4C A6 C2 AD
C240: AD 84 CA F0 61 C9 01 D0 2B
C248: 17 A9 03 8D E8 CA A9 CC C3
C250: 8D F8 07 AD EA CA C9 05 10
C258: F0 1A EE EA CA 4C 74 C2 8B
C260: A9 00 8D E8 CA A9 C9 8D 4C
C268: F8 07 AD EA CA C9 FB F0 82
C270: 03 CE EA CA AD EA CA D0 2C
C278: 08 A9 00 8D EB CA 4C A6 61
C280: C2 C9 06 B0 0E A9 01 8D 0A
C288: EB CA 38 A9 06 ED EA CA CA
C290: 4C 9E C2 A9 FF 8D EB CA 2C
C298: 18 AD EA CA 69 06 0A 0A 97
C2A0: 0A 0A 0A 8D 97 CA A9 00 58
C2A8: 8D E9 CA A5 02 C9 1B B0 28
C2B0: 0F 38 A9 1A E5 02 85 57 80
C2B8: A9 01 8D E9 CA 4C CC C2 81
C2C0: 18 A5 02 69 1A 85 57 A9 8A
C2C8: FF 8D E9 CA A4 57 C8 C8 98
C2D0: 98 0A 0A 0A 09 07 8D 93 B8
C2D8: CA 4C 3F C1 AD EC CA D0 27
C2E0: 08 A5 02 C9 1A F0 02 E6 4E
C2E8: 02 A9 01 A8 98 AA 18 A9 43
C2F0: C8 79 4E CB 99 F8 07 B9 A0
C2F8: 39 CB C9 1A F0 03 FE 39 0E
C300: CB C8 CC 7C CB D0 E5 4C AC
C308: 3F C1 AD 7D CB F0 15 C9 CF
C310: 01 D0 08 A9 7F 2D 15 D0 26
C318: 8D 15 D0 AD 1E D0 CE 7D 74
C320: CB 4C 02 C4 AD 1E D0 85 21
C328: 4E 29 01 D0 03 4C 02 C4 87
C330: A0 01 98 0A AA A5 4E 39 4C
C338: 25 CB D9 25 CB F0 03 4C 34
C340: D8 C3 BD 01 D0 CD 01 D0 0C
C348: B0 03 4C E4 C3 AD EC CA 56
C350: F0 03 4C D8 C3 BD 01 D0 BC
C358: 8D 0F D0 BD 00 D0 8D 0E EF
C360: D0 AD 10 D0 39 25 CB F0 DA
C368: 0B AD 10 D0 0D 2C CB 8D 94
C370: 10 D0 D0 09 AD 10 D0 2D E6
C378: 34 CB 8D 10 D0 A9 16 8D 34
C380: 7D CB A9 80 0D 15 D0 8D 74
C388: 15 D0 AD 8D CB C9 FF D0 10
C390: 05 A9 02 8D 8D CB 20 51 99
C398: C8 A5 02 C9 1B 90 15 C9 5D
C3A0: F0 90 0A 38 A5 02 E9 0A FF
C3A8: 85 02 4C BB C3 A9 E6 85 12
C3B0: 02 4C BB C3 38 A9 00 E5 46
C3B8: 02 85 02 18 AD EF CA 69 2C
C3C0: 01 8D EF CA AD F0 CA 69 DC
C3C8: 00 8D F0 CA 20 0C CA 8C 95
C3D0: 79 CB 20 58 C9 AC 79 CB 4A
C3D8: C8 CC 7C CB F0 03 4C 32 29
C3E0: C3 4C 02 C4 A9 01 8D 15 05
C3E8: D0 AD 7A CB F0 17 CE 7A FE
C3F0: CB 18 AD 7A CB 69 B0 8D 70
C3F8: E7 07 A9 02 8D EE CA 4C 27
C400: 8D C0 4C 3F C1 18 A0 10 64
C408: A2 0A 20 F0 FF A0 00 B9 20
C410: 40 CA F0 07 20 D2 FF C8 CE
C418: 4C 0F C4 20 D2 C8 18 A0 AC
C420: 12 A2 05 20 F0 FF A0 00 8B
```

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C428: B9 7E CB F0 07 20 D2 FF 17
C430: C8 4C 28 C4 A9 00 8D 15 7E
C438: D0 20 FA C8 B0 FB 4C 08 ED
C440: C0 8E 78 CB 8C 79 CB AD 53
C448: E6 CA C9 03 D0 05 A2 00 3F
C450: 4C 55 C4 98 AA 8A 0A AA 39
C458: BD 01 D0 C9 E6 D0 03 4C B8
C460: 40 C5 A0 00 BD 01 D0 D9 70
C468: 64 CA D0 2B 8A 4A AA AD C0
C470: 10 D0 3D 25 CB 85 4E F0 44
C478: 04 A9 01 85 4E 8A 0A AA 3A
C480: A5 4E D9 6C CA D0 10 BD 24
C488: 00 D0 D9 74 CA 90 08 D9 E4
C490: 7C CA B0 03 4C 9F C4 C8 05
C498: C0 08 90 C8 4C 6E C5 AD E8
C4A0: E6 CA C9 03 F0 03 4C 5C BB
C4A8: C5 CC EE CA F0 03 4C 40 75
C4B0: C5 B9 54 CA AA B9 4C CA CA
C4B8: A8 18 20 F0 FF A9 0E 8D CF
C4C0: 86 02 20 42 C9 20 51 C9 B0
C4C8: 29 07 CD EE CA F0 F6 8D F5
C4D0: EE CA 20 0C CA 20 58 C9 C3
C4D8: A9 02 8D 87 CB AD 24 CB 03
C4E0: C9 07 D0 05 A9 04 8D 87 4A
C4E8: CB 38 A9 08 ED 24 CB E9 66
C4F0: 01 D0 02 A9 08 18 69 B0 A8
C4F8: 8D DC 07 EE 24 CB AD 24 1B
C500: CB C9 08 D0 3B A9 00 8D E0
C508: 24 CB 18 AD EF CA 6D 23 09
C510: CB 8D EF CA AD F0 CA 69 F6
C518: 00 8D F0 CA 20 58 C9 AD 51
C520: 23 CB C9 C3 90 07 A9 FF DD
C528: 8D 23 CB D0 09 18 AD 23 67
C530: CB 69 3C 8D 23 CB AD 7C 48
C538: CB C9 07 F0 03 EE 7C CB FF
C540: AD E6 CA C9 03 D0 15 A9 FB
C548: 00 85 02 8D EA CA 8D EB 8C
C550: CA A9 01 8D EC CA CE 01 DA
C558: D0 4C 6E C5 AC 79 CB AE 4A
C560: 78 CB 38 A9 00 F9 39 CB 85
C568: 99 39 CB DE 01 D0 60 A5 BD
C570: 57 C9 19 90 03 4C 93 C5 E3
C578: AD E9 CA C9 01 D0 0E AD 32
C580: EC CA D0 0F EE 01 D0 20 F8
C588: 41 C4 4C 93 C5 CE 01 D0 D4
C590: 20 96 C5 4C 3F C1 8E 78 61
C598: CB 8C 79 CB AD E6 CA C9 5F
C5A0: 03 D0 04 A2 00 F0 02 98 A6
C5A8: AA 8A 0A AA BD 01 D0 C9 EB
C5B0: 32 D0 03 4C F6 C5 A0 00 60
C5B8: 18 B9 64 CA 69 03 DD 01 05
C5C0: D0 D0 2B BD 00 D0 D9 74 6A
C5C8: CA 90 23 D9 7C CA B0 1E 37
C5D0: 8A 4A AA AD 10 D0 3D 25 41
C5D8: CB 85 4E F0 04 A9 01 85 9D
C5E0: 4E 8A 0A AA A5 4E D9 6C A8
C5E8: CA D0 03 4C F6 C5 C8 C0 1A
C5F0: 08 D0 C5 4C 07 C6 AD E6 3E
C5F8: CA C9 03 D0 0B 38 A9 00 4E
C600: E5 02 85 02 EE 01 D0 60 90
C608: AC 79 CB 38 A9 00 F9 39 0F
C610: CB 99 39 CB 60 AD EB CA 3F
C618: F0 5A C9 01 D0 2B EE 00 19
C620: D0 D0 08 A9 01 0D 10 D0 62
C628: 8D 10 D0 AD 10 D0 29 01 4F
C630: F0 42 AD 00 D0 C9 4B 90 87
C638: 3B A9 FE 2D 10 D0 8D 10 C7
C640: D0 A9 14 8D 00 D0 4C 74 ED
C648: C6 AD 00 D0 D0 08 AD 10 24
C650: D0 29 FE 8D 10 D0 CE 00 86
C658: D0 AD 10 D0 29 01 D0 14 C6
C660: AD 00 D0 C9 14 B0 0D A9 24
C668: 01 0D 10 D0 8D 10 D0 A9 6F
C670: 4B 8D 00 D0 4C 3F C1 20 87
C678: FA C9 AD 87 CB C9 FF F0 F8
C680: 06 20 8B C9 CE 87 CB AC CA
C688: EE CA AD ED CA 49 01 8D 80
C690: ED CA AD ED CA F0 08 A9 52
C698: 0E 8D 86 02 4C A4 C6 A9 1E
C6A0: 09 8D 86 02 B9 54 CA AA 43
C6A8: B9 4C CA A8 18 20 F0 FF 4B
C6B0: 20 42 C9 4C 3F C1 CE 23 1C
C6B8: CB A9 12 20 D2 FF A9 0B E7
C6C0: 8D 86 02 A2 18 A0 12 18 5C
C6C8: 20 F0 FF AD 23 CB C9 0A 4A
C6D0: B0 05 A9 30 20 D2 FF C9 1D
C6D8: 64 B0 05 A9 30 20 D2 FF BF
C6E0: A9 00 AE 23 CB 20 CD BD D3
C6E8: AD 23 CB D0 03 4C E4 C3 4E
C6F0: A9 92 20 D2 FF 4C 3F C1 6D
C6F8: A9 01 A8 98 0A AA BD 01 58
C700: D0 D9 71 CB B0 08 AD 01 4F
C708: D0 DD 01 D0 B0 24 18 A9 1F
C710: C9 79 4E CB 99 F8 07 18 1F
C718: B9 39 CB 69 1A C9 07 B0 DB
C720: 08 A9 E6 99 39 CB 4C 32 D5
C728: C7 38 B9 39 CB E9 07 99 71
C730: 39 CB C8 CC 7C CB D0 C3 A7
C738: 4C 3F C1 B9 39 CB C9 1B 29
C740: 90 0B 18 B9 39 CB 69 1A 36
C748: 85 4E 4C 55 C7 38 A9 1A 81
C750: F9 39 CB 85 4E 18 A5 4E 2F
C758: 69 02 0A 0A 0A 09 07 4A 3C
C760: 4A 4A 4A 99 40 CB 60 A9 EE
C768: 01 A8 98 0A AA 20 3B C7 82
C770: 8E 78 CB 98 AA FE 47 CB 98
C778: BD 47 CB AE 78 CB D9 40 56
C780: CB B0 03 4C AF C7 A9 00 6D
C788: 99 47 CB B9 39 CB F0 1F 04
C790: 18 B9 39 CB 69 1A C9 1A CE
C798: B0 0C DE 01 D0 20 96 C5 82
C7A0: AC 79 CB 4C AF C7 FE 01 56
C7A8: D0 20 41 C4 AC 79 CB C8 5A
C7B0: CC 7C CB D0 B5 4C 3F C1 99
C7B8: A9 01 A8 98 0A AA B9 63 76
C7C0: CB D9 6A CB B0 0E 8E 78 62
```

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C7C8: CB 98 AA FE 63 CB AE 78 2D
C7D0: CB 4C 45 C8 A9 00 99 63 9D
C7D8: CB B9 55 CB D9 5C CB B0 32
C7E0: 0E 8E 78 CB 98 AA FE 55 59
C7E8: CB AE 78 CB 4C 45 C8 AD AF
C7F0: 15 D0 19 25 CB 8D 15 D0 54
C7F8: B9 4E CB C9 03 D0 23 FE 8C
C800: 00 D0 D0 09 AD 10 D0 19 52
C808: 25 CB 8D 10 D0 AD 10 D0 F5
C810: 39 25 CB F0 30 BD 00 D0 E9
C818: C9 4B 90 29 20 51 C8 4C 6D
C820: 45 C8 BD 00 D0 D0 09 AD 44
C828: 10 D0 39 2D CB 8D 10 D0 A9
C830: DE 00 D0 AD 10 D0 39 25 CC
C838: CB D0 0A BD 00 D0 C9 14 4B
C840: B0 03 20 51 C8 C8 CC 7C 40
C848: CB F0 03 4C BB C7 4C 3F 63
C850: C1 AD 15 D0 39 2D CB 8D 65
C858: 15 D0 20 51 C9 29 01 F0 94
C860: 16 A9 03 99 4E CB A9 14 94
C868: 9D 00 D0 AD 10 D0 39 2D CB
C870: CB 8D 10 D0 4C 88 C8 99 E1
C878: 4E CB A9 4B 9D 00 D0 AD A3
C880: 10 D0 19 25 CB 8D 10 D0 D9
C888: 20 51 C9 99 5C CB A9 00 2F
C890: 99 55 CB A9 DC 9D 01 D0 41
C898: 20 51 C9 29 03 99 6A CB CF
C8A0: 8C 79 CB 20 51 C9 29 03 D9
C8A8: A8 B9 35 CB AC 79 CB 99 97
C8B0: 71 CB 60 A5 C5 C9 04 D0 58
C8B8: 03 4C 00 C0 4C 3F C1 20 36
C8C0: 00 CA AD 8D CB C9 FF F0 4D
C8C8: 06 20 B3 C9 CE 8D CB 4C E0
C8D0: 3F C1 20 7E C9 20 DB C9 FF
C8D8: A9 04 85 4E A0 00 A2 00 9D
C8E0: 88 EA D0 FC EE 27 D0 EA F3
C8E8: EA EA CA D0 F3 C6 4E D0 34
C8F0: EB A9 0F 8D 27 D0 20 06 41
C8F8: CA 60 AD 00 DC A0 00 A2 F1
C900: 00 4A B0 01 88 4A B0 01 80
C908: C8 4A B0 01 CA 4A B0 01 93
C910: E8 4A 8E 84 CA 8C 85 CA FD
C918: 60 A9 0E 8D 86 02 A9 13 03
C920: 20 D2 FF A9 00 85 4E A5 36
C928: 4E A8 B9 54 CA AA B9 4C A8
C930: CA A8 18 20 F0 FF 20 42 2F
C938: C9 E6 4E A5 4E C9 08 D0 CD
C940: E6 60 A0 00 B9 5C CA F0 F9
C948: 07 20 D2 FF C8 4C 44 C9 65
C950: 60 AD 12 D0 4D 04 DD 60 D0
C958: A9 12 20 D2 FF 18 A0 06 C5
C960: A2 18 20 F0 FF A9 0B 8D 6E
C968: 86 02 AE EF CA AD F0 CA C3
C970: 20 CD BD A9 30 20 D2 FF E8
C978: A9 92 20 D2 FF 60 A0 00 A8
C980: A9 00 99 00 D4 C8 C0 19 3B
C988: D0 F8 60 AC 87 CB B9 88 F4
C990: CB 8D 01 D4 A9 08 8D 03 02
C998: D4 A9 00 8D 02 D4 A9 09 2E
C9A0: 8D 05 D4 A9 47 8D 06 D4 61
C9A8: A9 0F 8D 18 D4 A9 11 8D 24
C9B0: 04 D4 60 AC 8D CB B9 8E 38
C9B8: CB 8D 08 D4 A9 08 8D 0A 38
C9C0: D4 A9 00 8D 09 D4 A9 09 5D
C9C8: 8D 0C D4 A9 47 8D 0D D4 97
C9D0: A9 0F 8D 18 D4 A9 11 8D 4C
C9D8: 0B D4 60 A9 06 8D 08 D4 33
C9E0: A9 08 8D 0A D4 A9 09 8D 3F
C9E8: 0C D4 A9 47 8D 0D D4 A9 D3
C9F0: 0F 8D 18 D4 A9 41 8D 0B FD
C9F8: D4 60 A9 10 8D 04 D4 60 AE
CA00: A9 10 8D 0B D4 60 A9 40 71
CA08: 8D 0B D4 60 18 AD EF CA 56
CA10: 6D 7C CB 8D EF CA AD F0 AC
CA18: CA 69 00 8D F0 CA 60 A0 96
CA20: 00 B9 92 CB C9 0D F0 07 07
CA28: 99 00 32 C8 4C 21 CA A0 95
CA30: 00 B9 25 CC C9 0D F0 07 AA
CA38: 99 92 32 C8 4C 31 CA 60 08
CA40: 05 92 47 41 4D 45 20 4F 62
CA48: 56 45 52 00 02 20 11 0B 74
CA50: 05 0E 14 1F 0B 0B 03 15 C4
CA58: 07 11 07 0F 92 A3 B7 B8 2D
CA60: B8 B7 A3 00 7F 7F 3F CF 82
CA68: 5F AF 5F 9F 00 01 00 00 77
CA70: 00 00 00 01 1E 0E 94 66 98
CA78: 34 7D AE 04 4E 3E C4 96 C4
CA80: 64 AD DE 34 00 00 00 32 D7
CA88: 00 00 00 C8 00 00 01 00 52
CA90: 00 00 00 00 00 00 00 20 B0
CA98: 00 00 00 00 02 00 00 00 9A
CAA0: 10 00 00 00 03 00 00 17 CA
CAA8: 00 00 00 1E 00 00 00 01 C7
CAB0: 00 00 01 00 02 00 01 00 B4
CAB8: 00 00 02 00 00 00 03 00 BD
CAC0: 00 00 04 00 00 00 05 00 C9
CAC8: 00 00 06 00 00 00 07 00 D5
CAD0: 00 00 08 00 00 00 09 00 E1
CAD8: 00 00 00 00 00 01 01 00 DA
CAE0: 00 00 02 00 00 00 00 00 E2
CAE8: 00 00 00 00 00 00 02 00 EA
CAF0: 00 8E 08 12 97 53 43 4F 17
CAF8: 52 45 20 30 20 20 20 20 61
CB00: 20 20 54 49 4D 45 20 30 C0
CB08: 36 30 20 20 54 41 52 47 DD
CB10: 20 38 20 20 20 20 42 49 74
CB18: 52 44 53 34 9D 94 20 9D 26
CB20: 20 92 00 3C 00 01 02 04 16
CB28: 08 10 20 40 80 FE FD FB 1A
CB30: F7 EF DF BF 7F 46 78 A0 96
CB38: C8 00 00 00 00 00 00 00 01
CB40: 00 00 00 00 00 00 00 00 40
CB48: 00 00 00 00 00 00 00 03 4B
CB50: 00 03 00 03 00 00 00 00 56
CB58: 00 00 00 00 00 00 00 00 58
CB60: 00 00 00 00 00 00 00 00 60
```

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CB68: 00 00 00 00 00 00 00 00 68
CB70: 00 00 00 00 00 00 00 00 70
CB78: 00 00 03 00 00 00 05 92 13
CB80: 46 4C 41 50 21 00 00 00 C5
CB88: 19 17 15 17 19 00 32 32 62
CB90: 34 0A 00 00 00 00 80 00 4F
CB98: 00 80 00 00 A8 00 00 A8 6A
CBA0: 00 00 AA 00 00 AA 00 00 F5
CBA8: AA 00 00 AA 80 05 AA 80 AE
CBB0: F5 AA AA 00 AA 80 00 00 27
CBB8: 00 00 00 00 00 00 00 00 B8
CBC0: 00 00 00 00 00 00 00 00 C0
CBC8: 00 00 00 00 00 00 00 00 C8
CBD0: 00 00 00 00 00 00 00 00 D0
CBD8: 00 00 00 00 00 00 00 00 D8
CBE0: 00 00 00 00 00 00 00 00 E0
CBE8: 00 00 00 00 00 05 AA 80 19
CBF0: F5 AA AA 00 AA 80 00 AA 12
CBF8: 80 00 AA 00 00 AA 00 00 CE
CC00: A8 00 00 A8 00 00 A8 00 F9
CC08: 00 80 00 00 80 00 00 00 09
CC10: 00 00 00 00 00 00 00 00 10
CC18: 00 00 00 00 00 00 00 00 18
CC20: 00 01 80 C0 0D 00 C1 80 B1
CC28: 00 63 00 00 22 00 00 00 AD
CC30: 00 0F C1 F8 00 00 00 00 F9
CC38: 22 00 00 63 00 00 C1 80 FF
CC40: 01 80 C0 00 00 00 00 00 82
CC48: 00 00 00 00 00 00 00 00 48
CC50: 00 00 00 00 00 00 00 02 52
CC58: 00 00 02 00 00 2A 00 00 84
CC60: 2A 00 00 AA 00 00 AA 00 DF
CC68: 00 AA 00 02 AA 00 02 AA 6C
CC70: 50 AA AA 5F 02 AA 00 00 22
CC78: 00 00 00 00 00 00 00 00 78
CC80: 00 00 00 00 00 00 00 00 80
CC88: 00 00 00 00 00 00 00 00 88
CC90: 00 00 00 00 00 00 00 00 90
CC98: 00 00 00 00 00 00 00 00 98
CCA0: 00 00 00 00 00 00 00 00 A0
CCA8: 00 00 00 00 00 00 02 AA 55
CCB0: 50 AA AA 5F 02 AA 00 02 64
CCB8: AA 00 00 AA 00 00 AA 00 B8
CCC0: 00 2A 00 00 2A 00 00 2A 3F
CCC8: 00 00 02 00 00 02 00 00 CC
CCD0: 00 00 0D FF DD
```

MOVING UP TO PASCAL
FROM PAGE 79

SELF-ADDRESSED LABELS

```
·100 PRINT"SELF ADDRESSED LABELS"                    NK
·110 PRINT"BY CHERYL PETERSON"                       KP
·120 PRINT"FOR AHOY! MAGAZINE"                       IL
·200 REM INITIALIZE VARIABLES                        CD
·201 REM STRING VARIABLES NOT INITIATED              DA
·210 LINES=0:PASSES=0                                EN
·220 GOSUB 300                                       CD
·230 GOSUB 400                                       CE
·240 GOSUB 500                                       CN
·250 OPEN 4,4,0:CMD 4                                JE
·260 FOR Y = 1 TO PASSES                             DH
·270 GOSUB 700                                       CH
·280 NEXT                                            IA
·290 PRINT#4:CLOSE4                                  OA
·295 END                                             IC
·300 REM LABELFORMAT                                 NL
·310 INPUT"HOW MANY LINES PER LABEL";LINES           OK
·320 IF LINES<4 THEN GOTO 310                        OL
·330 LINES=LINES-4                                   HJ
·350 RETURN                                          IM
·400 REM PRINTNUMBER                                 OG
·410 INPUT"HOW MANY LABELS TO PRINT";PASSES          ID
·420 RETURN                                          IM
·500 REM READDATA                                    NB
·510 INPUT"ENTER FULL NAME--20 CHARACTERS OR L
ESS";NAME$                                           NL
·520 IF LEN(NAME$)>20 GOTO 510                       CP
·530 INPUT"ENTER ADDRESS--40 CHARACTERS OR LES
S";ADDRESS$                                          BB
·540 IF LEN(ADDRESS$) > 40 GOTO 530                  PI
·550 INPUT"ENTER CITY NAME--20 CHARACTERS OR L
ESS";CITY$                                           OH
·560 IF LEN(CITY$)>20 GOTO 550                       EJ
·570 INPUT"ENTER TWO CHARACTER STATE CODE";ST$       AC
·580 IF LEN(ST$)>2 THEN GOTO 570                     DJ
·590 INPUT"ENTER POSTAL OR ZIP CODE";ZIP$            JC
·600 IF LEN(ZIP$)>9 THEN GOTO 590                    LB
·610 RETURN                                          IM
·700 REM PRINT ROUTINE                               FC
·710 PRINT:PRINT NAME$                               LK
·720 PRINT ADDRESS$                                  NB
·730 PRINT CITY$;" ";ST$;" ";ZIP$                    JJ
·740 FOR X=1 TO LINES                                NL
·750 PRINT                                           JJ
·760 NEXT                                            IA
·790 RETURN                                          IM
```

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161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190
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271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300

A. Please check whether you are...
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B. What is your age?
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4. ☐ 35-44 5. ☐ 45-54 6. ☐ 55-64 7. ☐ 65+

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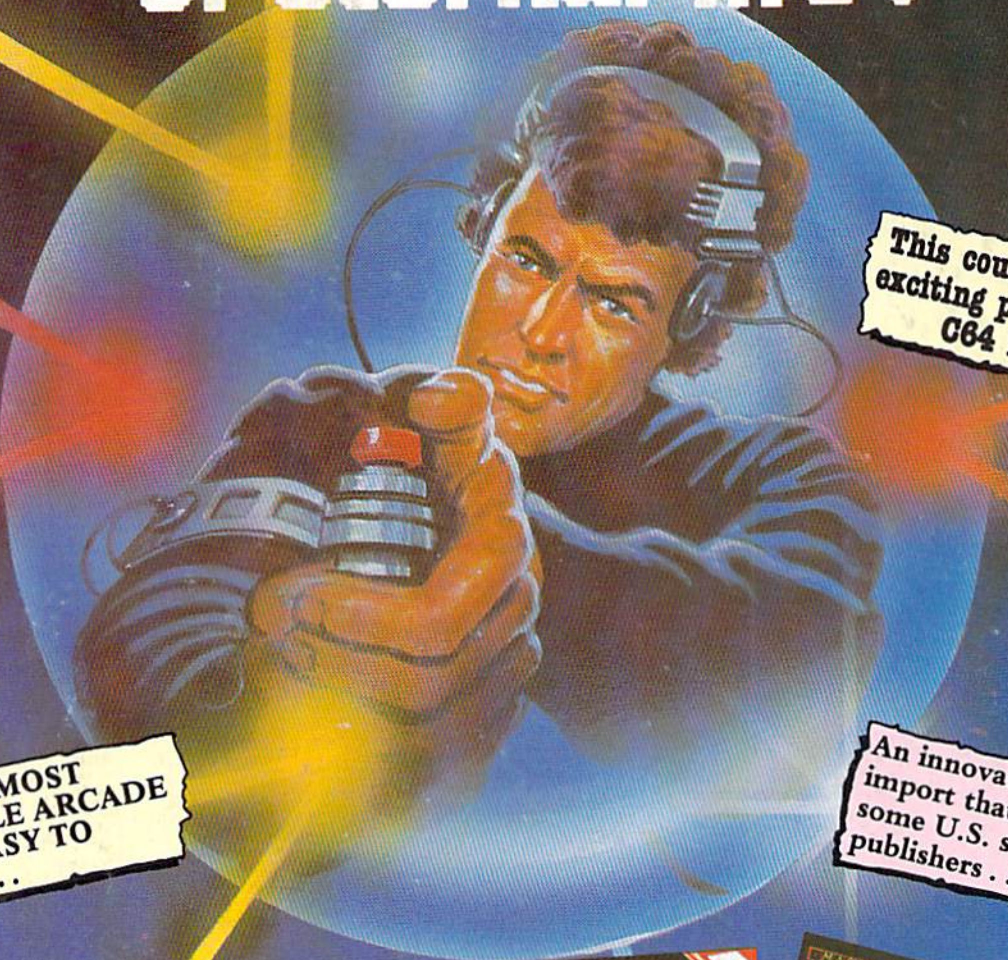
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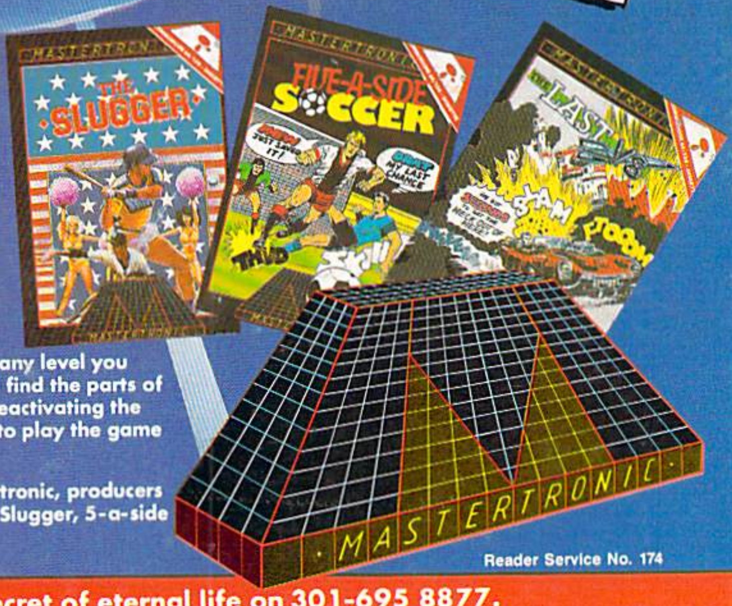
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